U.S. FISH AND WILDLIFE SERVICE

BIOLOGICAL OPINION AND CONFERENCE OPINION

LAND AND RESOURCE MANAGEMENT PLANS, AS AMENDED, FOR ELEVEN NATIONAL FORESTS AND NATIONAL GRASSLANDS IN THE SOUTHWESTERN REGION

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Box 1306
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In Reply Refer to:
Region 2/ES-SE

DEC 19 1997 000087RO

Charles W. Cartwright, Jr., Regional Forester
USDA - U.S. Forest Service
517 Gold Avenue SW., Room 6428
Albuquerque, New Mexico 87102-0084

Dear Mr. Cartwright:

The U.S. Fish and Wildlife Service (Service) has reviewed the biological assessments on the continuation of management direction pursuant to the Land and Resource Management Plans, as amended, for the Eleven National Forests and National Grasslands of the Southwestern Region of the Forest Service. Your request for formal consultation was received on May 15, 1996. This document represents the Service's biological opinion and conference opinion on the effects of that action on federally-listed and proposed threatened and endangered species, and designated critical habitat in accordance with Section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). The document does not include the Mexican spotted owl or its critical habitat as this species was the subject of two previous consultations.

This biological opinion and conference opinion is based on information provided in the May 15, 1996, and May 31, 1996, biological assessments, the June 10, 1997, supplements to those biological assessments that provided additional management direction for seven species, the Final Environmental Impact Statement for Amended Forest Plans (USDA 1995), your December 3, 1997, comments on the draft biological opinion and conference opinion, and other information contained in our files. A complete administrative record of this consultation is on file in this office.

It is the Service's biological opinion that the continuation of the management direction in the LRMP's is not likely to jeopardize the continued existence of any of the species considered, or destroy or adversely modify any designated critical habitat.

At least one term and condition is described for each animal species to minimize the amount of incidental take of the species. (See also Section IV, below, in which the Service concurs that formal consultation was not necessary for 15 additional species that the proposed action is not

likely to adversely affect, and concurs that the proposed action is not likely to jeopardize the continuing existence of the nonessential experimental populations of an additional five species.)

I. FORMAT FOR THIS DOCUMENT

This biological and conference opinion has been formatted to accommodate the large number of species involved in order to avoid unnecessary repetition. Sections II through IV provide the consultation history, description of the proposed action, and concurrences on informal consultation, respectively. Section V discusses previous section 7 consultations. Individual affected species accounts are presented in Section VI. Each of the Affected Species accounts contains the following sections:

Status of the Species (Range-wide)
Status of the Species (In the Action Area)
Effects of the Action
Cumulative Effects
Conclusion
Incidental Take Statement (animal species only)
Reasonable and Prudent Measures with Terms and Conditions (animal species only)
Conservation Recommendations (only if specific to that species)

In the Effects of the Action section for each species, the Service has considered direction in the LRMP's for all other program areas that are not listed and determined that the direction in those areas has insignificant, beneficial, or no effects to the species being considered. Cumulative Effects include the effects of future state, local, tribal, or private actions that are reasonably certain to occur in or affect the action area considered in this opinion. Future Federal actions are not considered in the Cumulative Effects section. Any non-federal actions proposed would require future Federal approval under section 7. The effects of the future Federal actions will be considered in the future section 7 consultations (see 51 FR 19933).

Following the Affected Species accounts are the following sections: VII, Continuation of the Incidental Take statements; VIII, General Conservation Recommendations; IX, Reinitiation Statement, and Literature Cited. The Forest Service's biological assessments on the Eleven National Forest LRMP's, the Regional Summary for Species that Occur on More Than One Forest, and the supplemental biological assessment should be referred to for more complete literature references, as well as for additional details on the biology of the affected species and on the National Forest (NF) program areas involved.

II. CONSULTATION HISTORY

The Land and Resource Management Plans for the Eleven National Forests and National Grasslands of the Southwestern Region (Region 3) have all undergone section 7 consultation at various times (Table 1). Subsequent to the completion of these consultations, a number of additional species have been listed or proposed for listing under the Act, and amendments to the LRMP's have been adopted (USDA 1996).

In January, 1996, the Regional Director of the Service and the Regional Forester of the Forest Service signed a consultation agreement that defined the process, products, actions, and schedule for completion of consultation on the Plans (excluding management for the Mexican spotted owl, which is covered in two separate biological opinions). In a letter dated May 15, 1996, the Forest Service requested initiation of the consultation. In a response dated May 24, 1996, the Service acknowledged receipt of the Forest Service's letter and requested the Regional assessment and biological assessments for the Tonto, Cibola, and Carson NF's, which were absent from the materials transmitted with the request to initiate consultation. Those biological assessments were transmitted to the Service on May 31, 1996.

On June 10, 1997, the Service received supplements to the biological assessments addressing additional management direction for seven species of particular concern. Those species are the: cactus ferruginous pygmy owl, Sonora chub, Little Colorado spinedace, loach minnow, Pima pineapple cactus, southwestern willow flycatcher, and spikedace. Clarifications dealing with these supplements were supplied by Forest Service letters dated July 2, 1997, and July 3, 1997. Supplemental biological assessments for the Sonora tiger salamander, Huachuca water umbel, and Canelo Hills ladies' tresses were transmitted to the Service by a letter dated August 1, 1997.

The Forest Service provided additional information on certain species on July 28, 1997 (Chihuahua chub); July 30, 1997 (Hualapai Mexican vole); and July 31, 1997 (Arizona agave).

On September 18, 1997, the Service transmitted a draft of this biological and conference opinion to the Forest Service. The Forest Service responded on December 3, 1997, with comments on the draft opinion.

Table 1. *Prior Consultations* on National Forest Plans in the Southwestern Region.

NATIONAL FOREST PLAN	FORMAL CONSULTATION DATE	PRIOR *BIOLOGICAL* OPINION	NUMBER OF *OF PLAN* AMENDMENTS
Apache-Sitgreaves	5/6/86	nonjeopardy	5
Carson	10/2/85	nonjeopardy	10
Cibola	2/13/85	nonjeopardy	7
Coconino	4/1/86	nonjeopardy	10
Coronado	12/6/85	nonjeopardy	7
Gila	10/4/85	nonjeopardy	7
Kaibab	2/27/87	nonjeopardy	2
Lincoln	7/19/85	nonjeopardy	9
Prescott	3/4/86	nonjeopardy	8
Santa Fe	8/11/86	nonjeopardy	7
Tonto	7/26/85	nonjeopardy	21

SOURCE: U.S. Fish and Wildlife Service Files

III. PROPOSED ACTION

The proposed action that is the subject of this consultation is the continuation of management direction of the Land and Resource Management Plans, as amended (hereinafter, "the LRMP's"), for the Eleven National Forests and Grasslands in the Southwestern Region of the Forest Service, as supplemented by additional management direction provided for the seven species of particular concern. The amendments included standards and guidelines for managing the Mexican spotted owl, northern goshawk, old growth, grazing (USDA 1995), in

addition to numerous forest-specific amendments. Table 1 lists the LRMP's, the Service's previously-issued biological opinions associated with each, and the number of amendments.

The conclusion of this consultation with the issuance of a final biological opinion does not preclude the need of the Forest Service to review their actions and consult with the Service on future site-specific activities carried out under the LRMP's that: (1) the Forest Service determines "may affect" listed species or designated critical habitat, and (2) have not completed formal section 7 consultation prior to finalization of this biological opinion. An exception is the treatment of certain, specified actions related to routine management activities for the Sonora tiger salamander. The proposed action for the biological opinion on the Sonora tiger salamander includes the specific actions of routine drafting of water from stock tanks for fire suppression, stock tank maintenance, tank use by cattle, and pre-project surveys.

The proposed action includes conservation measures in the form of additional protective management direction, issued pursuant to the existing LRMP's, for the seven species of particular concern addressed in the Forest Service's supplements to the biological assessments, dated June 10, 1997. The implementation of this Regional Direction was initiated by the Regional Forester's Memorandum to the 11 Forest Supervisors, dated June 2, 1997. The new management direction for these species is described below.

Pima pineapple cactus:

The supplemental biological assessment for the species includes additional management direction for the Coronado NF as follows:

1. Recreation:
   - Administratively restrict off-highway vehicles from occupied habitat.
   - Monitor compliance of closure annually.
   - Coordinate with the Service regarding adequacy of closure and additional needs to protect the species and its habitat.

2. Fire Induced Mortality:
   - Protect occupied sites from the effects of wildfires (fire intensity) and wildfire suppression activities.
   - Reduce the fuel loading on occupied sites, particularly the density of Lehman's lovegrass, to reduce the intensity of wildfires.

3. Grazing:
   - Consult with the Service on all grazing allotments with occupied habitat.

4. Inventory and Monitoring:
   - Annually, monitor occupied sites to record recruitment and mortality. Document observed causes of mortality.

- Annually, conduct surveys in suitable unoccupied habitat until all such habitat is surveyed. All suitable unoccupied habitat will be surveyed by the end of calendar year 2001.

5. Recovery Strategy:
   - Assess recovery opportunities in concert with the Service's Ecological Services Field Office in Phoenix, Arizona and implement this strategy as soon as practical.

Little Colorado spinedace, loachminnow, and spinedace:

The supplemental biological assessment for the three species includes additional Forest Service management direction as follows:

The following management direction for the Little Colorado spinedace, loach minnow, and spikedace is applicable to Forest Service lands on the six NF's where these species are found; Apache, Sitgreaves, Coconino, Prescott, Tonto and Gila. The management direction consist of long-term actions for the three fishes of concern that focus on general watershed conditions and riparian health within watersheds where they are found. The recommendations are primarily concentrated on direct effects from land management activities. Activities that affect greater landscape or watershed areas that support species habitats should be managed according to existing LRMP direction. Except where otherwise noted, emphasis should be given to maintenance and restoration of watersheds and riparian ecosystems through conformance with LRMP direction.

I. Long-term management direction for five NF's: Apache-Sitgreaves, Coconino, Gila, Prescott, and Tonto

A. Inventory and Monitoring

1. Conduct extensive inventories of all species habitat for presence or absence of species every 5 years.

2. Institute annual monitoring using established protocols at permanent sites in species habitat in order to establish baseline and trend for population and community structure, viability, and habitat parameters of species. Where permanent monitoring sites exist, forests will establish cooperative agreements with individuals/agencies doing the monitoring.

   a. Permanent sites with long-term datasets derived from monitoring using established protocols exist on streams in the upper Gila and San Francisco drainages in New Mexico and Arizona for spikedace and loach minnow, and the upper Verde River in Arizona for spikedace. Similar monitoring

protocols need to be established for Little Colorado spinedace in East Clear and Nutrioso drainages on Coconino and Apache NF's.

b. Habitat and fish inventories and monitoring should be done in collaboration with other state and Federal agencies, interested academic institutions, and private contractors. Personnel supervising inventories and monitoring will possess all permits required by the state or Federal governments, and will be journey-level fish biologists or equivalent. Appropriate recovery teams (Desert Fishes, Little Colorado spinedace) are available for advice, planning, and suggestions for implementation. Inventories and monitoring efforts will be in accordance with recommendations provided in existing or draft recovery plans.

c. When necessary, and when fully coordinated with state and Federal agencies, voucher specimens of the species or other fishes in the community may be taken for accession to established museums. Vouchers of species found outside of known range, and vouchers of species not previously recorded from a site should be taken.

3. Provide annual reports summarizing inventory and monitoring activities to state and Federal agencies having authority for the fishes, appropriate recovery teams, academic partners, and other interested parties.

4. Map and enter information on the fishes into GIS. The purpose of these databases is to make range-wide information on inventory and monitoring results available to all agencies. Prepare a base map showing species habitat for use when dealing with the following habitat recommendations.

B. Information and Research Needs

Coordinate with state and Federal agencies, academia, recovery teams, and other interested parties to identify information and research needs at local and regional levels.

C. General Management Activities

1. All short-term remedies will remain in place until new information dictates otherwise.

2. Amend LRMP's to incorporate guidance included in short-term and long-term direction, new data and information about the species, and direction contained in Recovery Plans, as appropriate. Amendments will be fully coordinated with the Service and state game and fish departments.

3. Forests shall use available regional fisheries personnel and expertise to the fullest extent possible.

D. Specific Management Activities

1. Recreation Management

   a. Remove, modify or mitigate the impacts of dispersed and developed sites or improvements within species habitat that have adverse effects (as determined by a biological assessment) on the species.

   b. Work to exclude off-road vehicle and all-terrain vehicle use from within species habitat, until a RATM is in place addressing the effects to these species. Discourage the use of and minimize the impacts of such activities adjacent to species habitat.

2. Wildlife and Fish Management

   a. All projects shall comply with current Forest Service direction for management of endangered, threatened, and proposed species.

   b. Accomplish recovery projects included in approved recovery plans for the three fish species involved. Develop an action plan to implement recovery plans on NF lands.

   c. Avoid all adverse effects (as determined by a biological assessment) on species habitats except when it is possible to compensate the adverse effects through alternatives identified in a biological opinion from the Service; when an exemption has been granted under the act; or when the Service biological opinion recognizes an incidental taking.

   d. Work to re-introduce the three species into unoccupied historical habitat.

3. Livestock Management

   a. Work to exclude livestock grazing from species habitat in stream courses with threatened and endangered fish species or their habitat, require a journey-level fisheries biologist review of the proposed grazing activity to determine if the grazing is appropriate to protect the fish, and if so at what level. If access to or crossing of species habitat is necessary, have a journey-level fishery biologist review the proposed action to determine appropriate location, timing, and mitigation measures.

b. Conduct frequent inspections of riparian pastures and exclosures to detect livestock trespass. Remove trespass livestock immediately. Check fences frequently and repair as needed.

c. Manage riparian areas with threatened and endangered fish species or their habitat to achieve proper functioning condition for riparian and aquatic ecological conditions.

d. In streamcourses with these three species or their habitats, require a journey-level fisheries biologist review the proposed grazing activity for suitability for threatened and endangered fish management and compliance with the programmatic biological assessment.

4. Timber Management

Exclude timber harvest activities from within or immediately upstream or adjacent to species habitat, as defined by a journey-level fisheries biologist.

5. Transportation Management

a. Conduct survey of all road crossings (wet, unimproved, culverts, bridges) within species habitat to determine needs for improvement. As needed, correct deficiencies in design and maintenance.

b. Off-road travel by any vehicle should be discouraged and minimized within species habitat. If crossing a streamcourse is necessary it should be limited to crossing perpendicular to it's direction of travel.

c. Access restrictions should be placed on areas where species habitat may be compromised by vehicular use.

d. Law enforcement, in support of the access policy, should focus on minimizing resource damage and user conflicts.

e. Adjacent to and within species habitat, vehicle barriers, parking facilities, signing, enforcement, and public education should be used to protect the habitat from vehicle damage, where appropriate.

6. . Watershed and Riparian Area Management

a. Projects impacting riparian areas shall be designed to protect the function and condition of riparian areas. Management objectives shall emphasize protection of soil, water, vegetation, and the wildlife and fish habitat.

b. In species habitat, activities that restrict or slow achievement towards proper functioning riparian and aquatic habitat conditions should be discouraged. Modify the proposed action or mitigate impacts to accelerate attainment of ecological objectives.

c. Methods and desired results for phreatophyte control or other vegetation manipulation within species habitat shall be determined through site-specific project analysis, and must meet ecological objectives.

d. Permit no water diversion for Forest Service purposes from within or immediately above species habitat in order to avoid stream flow depletion. Exceptions can be made in situations benefitting threatened and endangered species or their habitats. Such actions require the review by a journey-level fisheries biologist.

e. Large woody debris (tree boles, branches, and rootwads) should be allowed to remain in place in streamcourses in order to provide diverse habitats for the species.

f. Work to obtain water rights to protect instream flows within species habitats.

7. Mining and Minerals Management

Motorized mining, dredging, or material excavation of locatable minerals should be discouraged, and for non-locatable common variety minerals shall not be allowed, within, adjacent to, or immediately upstream of species habitat, as defined by a journey-level fisheries biologist, unless authorized through Section 7 consultation.

8. Lands and Special Uses Management

Seek to acquire private holdings within species habitat, or that may affect species habitat.

9. Fire Suppression and Fuels Management

a. Fire retardants shall not be applied directly to species habitat.

b. Plan, design and execute management ignited prescribe fires to protect species habitat which may be impacted by catastrophic wildfires. Require review by a journey-level fisheries biologist.

c. Provide adequate buffers, in management ignited prescribed fires, adjacent to suitable habitat as recommended by a journey-level fisheries biologist.

10. Heritage Resources

Recognize that native fishes are a part of the cultural resources of the national forests and manage accordingly.

II. Long-term management direction that applies to specific forests:

A. Apache-Sitgreaves National Forest

Seek to acquire the private fish hatchery on the Bush Creek allotment.

B. Coconino National Forest

1. Fully implement the requirements in the biological opinion for Hackberry/Pivot Rock, Buck Springs, and Bar T Bar allotments by excluding cattle from East Clear Creek.

2. Intensively and extensively survey streams in the Verde River drainage for presence of loach minnow.

C. Gila National Forest

Review (and strengthen) existing LRMP direction for riparian and threatened and endangered management. Incorporate new data and information regarding management of these resources.

D. Prescott National Forest

1. Prepare an annual operation and maintenance plan for heavily used dispersed recreation areas at FR638, Bear Siding, and Perkinsville. A part of this plan should require monitoring of the areas to determine environmental impacts.

2. Prepare a transportation plan for roads entering the Verde River riparian area. Coordinate with Arizona Game and Fish Department (AGFD) to provide law enforcement for access management at Morgan Ranch and FR638 access points.

3. Intensively and extensively survey streams in the Verde River drainage for presence of loach minnow.

E. Tonto National Forest

Intensively and extensively survey streams in the Verde River drainage for presence of loach minnow and spikedace.

F. Regional Office

1. Develop regional assessment by national forest of native fishes occupation, including both historical and current information.

2. Review regional compliance with the programmatic biological assessment for term grazing permit reissuance.

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Definition of Species' Habitat:

Relating to the streamcourse. All occupied, unoccupied suitable, potential, or designated or proposed critical habitat for the Little Colorado spinedace, spikedace, loach minnow, and Sonoran chub.

Sonora chub:

The supplemental biological assessment for the species includes additional management direction as follows:

1. Recreation:

   a. Obliterate roadways in Sycamore Canyon, south of Ruby Road.

   b. Close Sycamore Canyon to off-highway vehicles, south of Ruby Road.

2. Range:

   a. Eliminate livestock grazing in the riparian corridor of Sycamore Canyon south of Ruby Road.

   b. Eliminate livestock grazing in the riparian corridor of California Gulch, south of private land there.

   c. Management considerations for the Sonoran chub will be a primary issue in the allotment management plans development or ecosystem assessments for the grazing allotments including Sycamore Canyon and California Gulch, south of Ruby Road.

3. Monitoring:

   a. Conduct annual monitoring of the Sonoran chub populations in Sycamore Canyon and California Gulch to determine:

      (1) The effects of Forest Service management activities to Sonoran chub populations or habitat.

      (2) The effectiveness of mitigative actions implemented to protect the Sonoran chub.

      (3) Status of Sonoran chub populations and water availability for these populations.

Cactus ferruginous pygmy-owl:

The supplemental biological assessment for the species includes additional management direction for the Coronado and Tonto NF's as follows:

1. Survey: Each forest will conduct annual surveys for the cactus ferruginous pygmy owl for the sole purpose of locating new nesting and breeding locations; this will be in addition to project clearance surveys and surveys of historic locations. A minimum of 5,000 acres per year, per forest, will be surveyed annually. Inventory standards will follow the protocol approved by the Service and AGFD.

   Historic locations will be surveyed annually, unless gross habitat alteration has occurred rendering the habitat unsuitable.

   Survey prior to any owl habitat disturbing activity.

2. Biological Review and Consultation: Journeyman-level biologists on the Tonto and Coronado NF's will review all projects affecting habitat structure and composition of mesquite bosques, lowland cottonwood forest, and mesquite-cottonwood woodlands for impacts to the cactus ferruginous pygmy owl. If the determination by the action agency biologist is a "may effect", then consultation with the Service will occur.

   Journeyman-level biologists will review all projects affecting habitat structure and composition of all desertscrub habitats that possess the characteristics needed by this owl, as defined by the Service. If the determination by the action agency biologist is a "may effect" then consultation with the Service will occur.

3. Occupied Habitat: In areas where it is determined that cactus ferruginous pygmy owls are occupying a site during the breeding period, the Forest Service shall:

   a. Retain all nest trees and nest cacti;
   b. maintain and restore habitat;
   c. minimize noise disturbance during the breeding and nesting season;
   d. avoid harassment of individual owls;
   e. prohibit frequent or lengthy low-level flights over occupied habitat during the breeding season; and
   f. prohibit overgrazing by livestock that degrade composition and vigor of understory vegetation.

4. Conservation Assessment: The Southwestern Region of the Forest Service will fund and cooperate in the development of a conservation assessment for the cactus ferruginous pygmy-owl in cooperation with personnel of the Rocky Mountain Forest and Range Experiment Station. This assessment will identify habitat features necessary to support breeding populations for owls, including a profile for the subset of desertscrub that likely supports this species.

Southwestern willow flycatcher:

The supplemental biological assessment provides management direction as follows:

I. General Recommendations

A. Inventory, Monitoring, and Mapping

1. Obtain the proper Federal permits from the U.S. Fish and Wildlife Service (Service) and attend the appropriate training sessions prior to conducting inventory or nest monitoring.

2. Conduct site visits to habitat in order to evaluate suitability for willow flycatchers. The goal is to identify all suitable and potential habitat on each national forest. Site visits to potential habitat should be conducted every few years in order to track its progression towards suitable conditions.

3. Conduct annual inventories according to protocol at all known occupied sites and suitable habitat to determine willow flycatcher occupancy. The goal is to document flycatcher occupancy and record general observations.

4. Conduct annual monitoring at all sites occupied by flycatchers. Only qualified personnel certified in acceptable monitoring techniques should monitor sites using one of two levels of monitoring. The determination of which level to use should be based on information needs and site-specific considerations. Coordinate with the

Service, state game and fish agency, and any agency or organization conducting on-going research at occupied sites, to determine which level of monitoring is appropriate. The two levels of monitoring are:

a. Intensive monitoring - Requires frequent visits to each nest. The goal is to determine nesting success by observing clutch size, number of hatchlings, and finally the number of successful fledglings. Information on cowbird parasitism, predation, and outcome of clutch is also noted. This level of monitoring can be disturbing to breeding flycatchers because it requires that nests be approached and looked into. Extreme caution and adherence to protocol is necessary. Nest abandonment is most likely to occur during the nest building and egg laying stages. Therefore, if at all possible, nests should not be approached during those periods. This level of monitoring should only be conducted if determined necessary through consultation or upon request of the state game and fish agency.

b. Low-intensity monitoring - Involves a less invasive method of obtaining information. Nests are not approached or looked into. The goal is to determine pair formation by visual observations of male and female flycatcher interactions as well as by auditory detections of male and female vocalizations. Because the nest is not approached, specific information such as clutch size, number of hatchlings, number of fledgling, and cowbird parasitism is generally not obtained. Incidental information, such as observations of adults feeding fledged flycatcher and/or cowbird young, is important and should be noted.

5. Each Forest is responsible for mapping and entering the following information on southwestern willow flycatchers into a Geographic Information System (GIS): with critical habitat identified

a. Historical sightings
b. Occupied Habitat
c. Suitable Habitat
d. Potential Habitat
e. Unsuitable Critical Habitat
f. Annual Inventoried Areas

This information should be consistent with the mapping effort initiated by the Bureau of Reclamation and the U.S. Geological Survey (USGS) in response to consultation on the Modified Roosevelt Dam Project. The purpose of this database

is to make range-wide information on flycatcher inventory and monitoring results available to all agencies. Specifics on this mapping effort are being finalized.

B. Information and Research Needs

1. Identify information and research needs at local and regional levels. Pursue opportunities with other agencies and researchers to fund and support studies. Some preliminary research and information needs are as follows.

   a. Cowbird travel distances at high and low elevation sites as determined by radio telemetry, preferably where greater than 10 pairs of flycatchers are present.

   b. Temporal and spatial variation in cowbird parasitism of willow flycatcher nests in the Southwest.

   c. Impacts of various land uses, such as livestock grazing and recreation, on habitats, food supplies, and behavior of willow flycatchers.

   d. The impacts and effectiveness of various cowbird and predator control techniques such as cowbird and/or predator trapping, addling or removing cowbird eggs, livestock manipulation, vegetation management, and predator deterrents (e.g., mothballs).

   e. Livestock movements and concentrations, relative to cowbird presence and behavior, especially in pastures in the vicinity of occupied flycatcher habitat.

   f. Taxonomic clarification of the subspecies of flycatchers nesting at high elevations.

   g. Identification of predator species, factors that affect their presence and abundance, and their impacts to nesting willow flycatchers.

   h. Identification of habitat features that affect nest success.

   i. Nest success rates that result in population replacement and growth. This will help identify sites where parasitism and/or predator control will be effective in promoting population maintenance and recovery.

C. Regional Office Level Needs

1. The Region should conduct an annual comprehensive review of all surveys (habitat evaluation, inventories, monitoring), research activities, cowbird control programs, habitat improvement projects, and any other actions pertaining to the southwestern

willow flycatcher and its habitat. The objective is to coordinate research and management activities, and to apply an adaptive management strategy at each occupied site, adjusting management year-to-year based on new information at local and regional levels. Information should be used to help identify specific actions to be taken at occupied sites, surveys to be conducted, research to be done, cowbird control strategies to be applied, etc.

2. The Regional GIS Coordinator should obtain electronic copies of each forest's current flycatcher maps annually.

3. The Regional Office should assist in the continued coordination with Arizona and New Mexico State game and fish agencies in order to standardize inventory and monitoring protocols and training between both States.

D. Management Activities

Habitat Management

1. Do not allow activities that slow or prevent progression of any potential habitat (habitat within 10 years of becoming suitable) towards suitable conditions, or that reduce the suitability of occupied or unoccupied suitable habitat.

2. Identify potential habitat closest to occupied sites as highest priority for active or passive management with the objective to move it towards suitable conditions as soon as possible.

Livestock Grazing

1. Exclude livestock grazing (year-long) in occupied flycatcher habitat to avoid direct impacts to flycatchers and their habitats. In the future, results from inventory, monitoring and research may help determine what levels and timing of livestock grazing may be allowed in occupied habitat. However, until further information from surveys and research program is available, do not allow livestock grazing in occupied flycatcher habitat year-round.

   In the December 3, 1997, comments on the draft opinion, the Forest Service indicated that this direction had been modified to allow grazing in occupied southwestern willow flycatcher habitat outside of its breeding season, but only where southwestern willow flycatcher research is occurring under an approved research plan

2. Conduct frequent inspections of riparian pastures and exclosures to detect trespass livestock. Remove trespass livestock immediately. Check and repair fences as needed.

3. Implement or continue brown-headed cowbird control programs based on consultation requirements and site-specific determinations of need for this action. Some of the factors to be evaluated are: history of parasitism (occurrence and rate), consistency of site occupancy, and number of pairs. If a control program is implemented, consult with the Regional Office and knowledgeable individuals to determine what technique to use (trapping, nest manipulation, etc.). Flycatcher nests must be intensively monitored to evaluate changes in parasitism rates and flycatcher nesting success in order to determine the effectiveness of cowbird control programs.

Recreation

1. Evaluate recreational impacts at sites with occupied, suitable or potential flycatcher habitat. Implement actions such as area closures (seasonal or year-round), road closures, interpretation, fencing, special use permit requirements etc., to minimize recreational impacts.

2. Evaluate the presence and abundance of trash at developed and dispersed recreational sites that occur within the vicinity of occupied flycatcher habitat. Monitor cowbird and predator attraction to, and use of, trash sites. Implement measures such provision of trash receptacles, regular trash pick-ups, area closures during the breeding season, etc., to minimize cowbird and predator attraction.

3. Consider interpretation opportunities to inform the public of threats to flycatchers and their habitat as well as ways to minimize impacts. Issues include the following:
(1) The presence of trash providing food for cowbirds and other predators;
(2) recreational activity impacting habitat via trail creation and removal of vegetation for firewood; and
(3) disturbance from recreational activity especially during the nest building, egg laying, and incubation periods that can cause nest abandonment.

4. In order to avoid impacts from large groups in flycatcher habitat, consider site-specific area closures to groups over a certain size. The recreation policy that requires permits only for groups of 70 people or more has potential to be detrimental to flycatchers and their habitat.

Lands

1. Pursue land acquisition where potential or suitable flycatcher habitat occurs adjacent to or near occupied habitat.

Fire

1. Coordinate with fire management personnel to develop a strategy for responding to wildfires that could threaten occupied flycatcher habitat. The locations of flycatchers should be disclosed to the fire organization before each breeding season to ensure immediate protection upon the outbreak of a fire. Develop a fire plan that focuses on proactive preventative measures such as construction and maintenance of pre-attack fuel breaks and reactive measures such as methods to achieve immediate containment and suppression of fire.

E. Coordination/Collaboration

1. Communicate and cooperate with state game and fish departments on efforts related to southwestern willow flycatchers. Collaborate on wildlife population management for elk and beaver in the vicinity of occupied sites. Coordinate and communicate with state personnel on planned or ongoing inventories, monitoring, and research.

2. Communicate, cooperate, and consult with the Service on efforts related to southwestern willow flycatchers. Involve the Service as early as possible in planning and analysis stages for projects that could directly or indirectly affect occupied, unoccupied suitable, potential, or proposed critical willow flycatcher habitat.

3. Seek out, utilize, and share information from researchers and other individuals with knowledge about willow flycatchers, cowbird parasitism, predation, and other related issues.

II. Site Specific Recommendations

A. Apache-Sitgreaves NF

Greer Sites

1. Work with AGFD to manage elk herds in order to minimize impacts to suitable and potential flycatcher habitat. Cooperate and provide input on hunt recommendations. Evaluate the need for elk-proof fencing as a temporary measure while working to meet management goals.

2. Develop and implement a recreation management plan for the Greer area that will provide recreation opportunities while minimizing impacts to suitable and potential flycatcher habitat. Work cooperatively with local landowners and businesses.

3. Begin discussions with AGFD regarding management of beavers in the Greer area. Evaluate the need for control or introductions in order to maintain and develop suitable flycatcher habitat.

4. Evaluate and pursue the acquisition of additional riparian habitat in the Greer area, especially where adjacent or near occupied habitat.

Alpine

1. If it is determined that elk use is responsible for degradation of occupied or potential habitat as determined by monitoring of the test exclosure (see short-term recommendations), work with AGFD to manage elk herds to minimize impacts to flycatcher habitat. Cooperate and provide input on hunt recommendations. It may be necessary to expand the elk-proof fence to encompass all occupied and potential habitat at the Alpine site. Consider this a relatively short-term measure to protect and develop habitat while working to meet longer-term management goals.

2. Monitor the association between cowbirds and Forest Service livestock when livestock are present in pastures and corrals. Use this information to evaluate the continued need for cowbird control or the need to use alternative stabling and pasturing facilities during the flycatcher breeding season.

3. Manage potential habitat to become suitable as soon as possible using appropriate techniques (i.e., fencing, willow planting, etc.) to expedite habitat development.

Nelson Reservoir

1. Work with AGFD to manage local elk herds at the Sipe Ranch elk refuge to minimize impacts in suitable and potential flycatcher habitat. Cooperate and provide input on hunt recommendations. Evaluate the need for an elk-proof fence as a temporary measure while working to meet management goals.

2. Begin discussions with AGFD regarding management of beavers. Evaluate the need for beaver control in order to maintain and develop suitable flycatcher habitat.

B. Carson National Forest

Tierra Azul

1. Coordinate with the state transportation organization to control illegal dumping along State Highway 518. Conduct annual or bi-annual trash pick-ups at dump sites; at least one pick-up should occur prior to the flycatcher breeding season.

2. Evaluate the potential and pursue the acquisition of approximately one-half mile of riparian habitat along the Rio Grande del Rancho immediately north of Forest Service land in T. 24 N., R. 13 E. Sections 7 and 8.

3. Evaluate existing pullouts along the highway (developed and undeveloped). Consider the development of a plan for providing and/or closing pullouts with the intent of encouraging birding, fishing, and other recreational opportunities at locations that will minimize impacts to riparian habitat. The use of fencing or rock may help to focus traffic.

C. Cibola National Forest

Bluewater

1. Implement the road and recreation management plan that is to be developed in 1997 (see short-term recommendations). If trash is a problem at the occupied site, consider management strategies such as provision of trash receptacles, regular trash pick-up, area closures during the breeding season, etc., to minimize cowbird and predator attraction.

2. Pursue land exchange/purchase opportunities in the vicinity of the occupied sites.

3. Develop a site plan to implement a seasonal recreation closure in suitable habitat. Consider using buck and pole fencing and providing interpretive information on riparian values.

4. For Native Americans and other groups wanting to collect riparian vegetative species, provide alternate collection sites that avoid flycatcher habitat.

5. When the Bluewater site becomes occupied by willow flycatchers, monitor the site to determine nest success and gain information on cowbird parasitism for at least one breeding season. If parasitism is determined to be a problem at this site, implement a cowbird control program. Because a unique situation may exist to evaluate whether removing livestock from the vicinity of the occupied site during the breeding season has an impact on parasitism rates, the Forest should cooperate

with research to design and implement a livestock removal study if determined to be appropriate at this site. The preferred method may be to exclude Forest Service livestock within 2.5 mi between the dates of May 1 and July 31. Trapping or other control methods could be evaluated as alternatives.

D. Coconino and Prescott National Forest's

Tuzigoot/Tavasci Marsh

1. Continue to cooperate with the AGFD, Phelp's Dodge, U.S. Geological Society, and other entities to implement mandatory and discretionary measures specified in previous consultation. This involves the cowbird control program and ongoing research activities.

2. Continue to evaluate and document cowbird activity associated with livestock activity and refuse from recreational activities.

E. Gila National Forest

1. Continue development and implementation of management activities related to the Gila Bird Area project. This project's focus is wetland development and riparian management to provide occupiable habitat for southwestern willow flycatchers and other riparian birds.

F. Tonto National Forest

Salt Inflow

1. Do not allow livestock grazing in potential or suitable habitat that occurs adjacent to the occupied site. This can be accomplished by either removing livestock from the pasture in which the habitat occurs or by constructing a fence around the habitat to exclude livestock.

This biological and conference opinion covers each of the 11 LRMP's under consideration until the date of revision respective revisions. Table 2 indicates the projected years for revision of the LRMP's, the latest being the year 2003 for the Kaibab National Forest.

Table 2. Tentative National Forest Plan Revision Schedule in the Southwestern Region

NATIONAL FOREST	PLAN DATE	5 YEAR REVIEW	START REVISION	EST. COMP. REVISION	MANDATORY REVISION
Apache-Sitgreaves	1987	1994	2000	2002	2002
Carson	1986	1992	1997	1999	2001
Cibola	1985	1990	1996	1998	2000
Coconino	1987	1992	2000	2002	2002
Coronado	1986	1991	1998	2000	2001
Gila	1986	1991	1997	1999	2001
Kaibab	1988	1993	1999	2001	2003
Lincoln	1986	1991	1999	2001	2001
Prescott	1987	1992	1998	2000	2002
Santa Fe	1987	1992	1999	2001	2002
Tonto	1985	1990	1996	1998	2000

SOURCE: Supplement to Biological Assessment, Appendix H.

The management program areas covered in the LRMP's that have been considered in this biological and conference opinion are summarized here (the individual national forest LRMP's should be referred to for more detailed descriptions):

A. Timber Harvest and Forest Management

This is not intended as an exhaustive discussion of forest management and does not attempt to cover every detail of the silvicultural prescriptions in Southwestern forests. However, in the Southwest, two broad classifications of silvicultural systems are based on methods of reproduction and resulting age-class mixes of forested stands. These systems are even-age and uneven-age management. Even-age management, which usually involves relatively small differences in stem ages within a given stand, have commonly been used in Southwestern forest types. Even-age management includes activities such as clearcutting, shelterwood, and seed tree methods. Uneven-age forest management also is used in the Southwestern forests, and this system primarily employs individual tree and group selection methods. Individual or single tree selection, as the name implies, involves the removal of single, scattered trees, and group selection involves the removal of a small patch of trees. The width of these patches are usually less than twice the height of the dominant (i.e., largest) tree, and the treatments tend to create a landscape mosaic composed of small, usually 1/4-2 acre, patches.

Other forest management methods include activities such as thinning, salvage, and personal-use fuelwood activities. Thinning treatments usually fall into two categories; pre-commercial and commercial thinning. Generally, thinning is considered the practice of removing some of the smaller trees in a stand so that remaining trees will grow faster. Salvage is most commonly used to remove dead and dying trees as a result of forest pests/pathogens or fire. These methods remove dead, damaged, or susceptible trees primarily to prevent the spread of pests or pathogens. Also, personal fuelwood gathering of dead and down timber and small green wood is generally permitted throughout the Southwest in the national forests, and may be allowed across all forest and woodland types.

B. Fire Management

Fire prevention over approximately the past 100 years has altered the forest landscape. Stand densities are very high and contain increased fuel loading from timber harvests. Fire management through prescribed burning, fuels management, and prescribed natural fires is being used to reintroduce fire back into the system.

Fire management and protection includes planning and analysis, fire prevention, fire detection, fire suppression, fuels treatment, and law enforcement. Reduction of ground fuels can be accomplished by fire projects. Prescribed burning is used to in many areas as a fuels treatment method. Other practices such as burning, lopping, chipping, and dozer and hand piling are sometimes used after timber harvest to reduce fire hazards.

Treatment of fuels after timber harvests generally have correspondingly declined with declining timber harvests. Generally, existing levels of down material and logs are retained to allow for the prey needs of the Mexican spotted owl.

In national forests where there are wildlife/urban interfaces, fire management concerns exist. Here, the threat of catastrophic fire is increased by the increased number of recreational activities and private residences. In these areas, prescribed burning is sometimes used to avoid the buildup of conditions favorable to catastrophic fires.

C. Range Management

Range management in the Southwestern national forests involves the management of rangeland vegetation, and allows for its management to be integrated into other resource programs of the national forests so as to allow achievement of multiple use objectives. This management also is to provide for livestock forage, wildlife food and habitat, outdoor recreation, and contains the goal of promoting economic stability for communities that depend upon range resources. On the National Grasslands, additional goals are to promote the development of grassland agriculture and sustained yields of soil, water, forage, fish and wildlife, recreation, and timber resources. Activities carried out within range management include livestock and wild ungulate grazing, prescribed fires, and mechanical and chemical treatments to manage range vegetation. These activities also may entail wild free-roaming burro populations and noxious weed management.

D. Mining

This program area involves the administration of the mining and mineral laws and regulations that are designed to support energy and minerals exploration and development while minimizing surface resource impacts. Energy and mineral resources that occur on the national forest lands in Arizona and New Mexico vary from locatable minerals, leasable minerals, and salable minerals. The program encourages studies to determine the availability of locatable minerals, geothermal resources, uranium, nonenergy minerals, and common variety minerals. The most common types of mineral resource development are mineral materials from sand pits, and gravel and cinder used in road maintenance, construction projects, and personal use. Other mineral resources derived from the national forests include pumice, limestone, gypsum, copper, and ornamental rocks. Both gypsum and copper acquisition involve mining activities. Oil and gas leases also occur on Forest Service lands.

The goal of the minerals program is to provide for energy and mineral development and reclamation. Mineral development activities in the national forest can involve tree clearing, stripping dirt and rock overburden, road construction and maintenance. Standards and guidelines provide guidance for mining and leasing activities within the framework of environmental laws and regulations, including those for the mitigation of mining impacts. Placer mining activities also are a consideration in the minerals program because of the

activity's inherent operations near water for the purpose of washing placers. However, only about 100 acres of placer mining are found in the Southwestern Region of the Forest Service.

E. Soil and Water

Soils activities of the Forest Service involve: inventories of resources; analysis, predictions of project impacts, project and special use prescriptions and limitations based on the analysis of inventories; and monitoring to assess mitigation and impacts.

Water activities include water use and protection. These are primarily administrative activities involving assurance that Forest Service programs and activities have necessary water rights. This includes documenting, locating and tracking water uses, securing and protecting water rights, providing testimony in water basin adjudications and monitoring uses. Water protection activities include obtaining necessary state and Federal permits, predictions of water quality effects, and development of mitigation measures prescriptions for Forest Service activities that have an effect on streams, lakes or wetlands. Watershed assessments are used to evaluate land and channel conditions, and to prioritized improvement needs. Water quality monitoring provides baseline information on stream health and indicates effectiveness of mitigation measures.

The watershed activities are involved with the identification of areas in need of treatment and the implementation of improvements. Annually about 2,000 acres receive direct treatment to improve degraded watershed conditions. These treatments include the installation of channel structures, planting grasses, shrubs and trees, road obliteration or relocation, abandoned mine restoration and other treatments that increase ground cover or improve infiltration. Most, if not all, of the 2,000 acres per year of watershed improvement is conducted in the piñon-juniper habitat type. The Forest Service may also assess and make treatment prescriptions whenever natural disasters, such as large wildfires, floods, or windstorms affect watershed conditions.

F. Recreational Management

Recreational programs in the Southwestern national forests are provided to maximize outdoor opportunities for visitors to the Forests. Included within the recreational program are the development and management of sites and facilities, and the allowance for concessions operation within the Forests.

G. Off-road vehicle management

This program is to provide a diversity of off-road recreational opportunities within the national forests that: (1) Are compatible with established land and resource management objectives; (2) are consistent with the capability and suitability of the resources; (3) are appropriate activities under the Forest Service Manual; and (4) have a demonstrated demand. Other activities include the: (1) Designation of all national forest lands in one of three categories; open,

restricted, or closed; (2) placement of signs in the Forests to designate off-road use restrictions; (3) providing maps to the public regarding areas permitted for off-road use; (4) closure of areas where off-road use is not permitted; (5) actions to provide alternatives to closures; and (6) monitoring and evaluation of off-road vehicle use. Permitting for off-road competitive activities also is a part of this program.

H. Wilderness Management

The wilderness management program's stated objectives are in summary: (1) To provide for the maintenance and perpetuation of wilderness as one of the multiple uses of the national forests; (2) to maintain wilderness such that ecosystems are unaffected by human influences; (3) the minimization of impacts from uses allowed under all legislation regarding wilderness; (4) to protect wilderness character and public values; and (5) to gather and carry out research in a manner that is compatible with preserving wilderness environment. Activities within this program area may include: management of activities allowed under legislation in wilderness areas; ceasing the use of, and the removal of, some existing structures within wilderness areas; and acquisition of non-federal lands for inclusion in a wilderness area.

I. Fish and Wildlife Habitat

Fish and wildlife management activities involve the maintenance of an active habitat improvement program directed at maintaining and regenerating various ecosystem components; improving riparian habitat; and the use of vegetation manipulation through timber harvest, prescribed fire, seeding, and shrub planting to improve fish and wildlife habitat diversity. Other activities include the construction of wildlife watering facilities, fencing of special wildlife habitats, warm and cold water fisheries habitat improvement and reintroduction of native species to certain areas. In this regard, the LRMP's offer guidance for habitat inventory and evaluation of fish and wildlife species, as well as habitat for proposed and listed threatened, endangered, and sensitive species.

The LRMP's also offer guidance for the management of sensitive species not already listed as endangered or threatened, the sustaining of viability, and prevention of the need for listing. Studies to ascertain the suitability for reintroduction of endangered, threatened, proposed, and state-listed native species into suitable habitats also are guided by the LRMP's. These studies are to be accomplished in conjunction with development and approval of recovery plans. All projects are to be coordinated through integrated resource management practices.

J. Cultural Resources

Activities involved in the cultural heritage program area include field surveys and evaluations for proposed land management activities. These are conducted to provide information on historic properties in support of analyses conducted for National Environmental Policy Act (NEPA) planning and also the National Historic Preservation Act. Educational and public

outreach activities, site protection, archaeological excavations, salvage operations, and interpretation for Forest visitors also are a part of these activities.

K. Facilities

Facilities management includes construction, maintenance, and use of facilities in the national forests. Facilities include Forest Service District offices and compounds, fire guard stations, fire lookout towers, telephone lines, and others. In the past 10 years, few new buildings have been constructed, and of those that were, almost all were built at existing administrative sites with no associated or resulting habitat alteration.

L. Transportation

The LRMP's allow for provision and management of a serviceable road transportation system in the national forests for access and user safety, land management, and resource protection. About 55,100 mi of roads exist on national forest lands in Arizona and New Mexico. Of this, the Forest Service has jurisdiction on about 50,700 mi. Use of these roads varies widely. Only about 13 percent of these roads are considered to be "high standard" that can be used by passenger cars. About 71 percent are not maintained for passenger cars but may be used by high clearance vehicles, while the remaining 16 percent are closed. Road densities in the national forests range from less than 1 mile of road per square mile to more than 10 mi per square mile. The average density is 1.8 mi per square mile. Road construction, relocation, operation, maintenance, and obliteration are activities within the Forest Service transportation management program area.

M. Realty Actions

This program area involves Forest Service land exchange and land purchase programs and seeks to consolidate national forest system lands, to meet specific resource needs, to improve land ownership patterns, and to eliminate access problems. In order to do this, lands are sometimes conveyed to meet the needs of growing urban populations, as well as acquired from private inholdings scattered throughout the Forests. Land acquisitions may also be used to obtain needed access to the Forests. The Forest Service's information reveals that as much as 50 percent of the average of 2,400 acres of non-federal land acquired each year is valuable for important watersheds, riparian areas, habitat for threatened and endangered species and other wildlife, wetlands, and recreational opportunities.

N. Special Uses

Special use authorizations include solid and liquid waste disposal systems, sewage, transmission lines, schools, service buildings, power line transmission corridors, telephone and telegraph lines, airway beacons, electronic and astrophysical sites, water transmission pipelines, dams, reservoirs, water treatment plants, organization camps, resorts, marinas, ski

lifts, ski slopes, snow play areas, and military training areas. Other special use authorizations involve recreational residences, private lodging, outfitter and guide services. About 6,000 special use authorizations were in effect across the southwestern national forests during Fiscal Year 1995.

Special use authorizations provide authority for use of national forest lands for a wide variety of reasons. Authorized facilities and services are provided for public health, welfare, safety, convenience, and national security. As a part of special uses, other Federal agencies have some authority for the use of Forest Service lands. Some of these authorities include the Bureau of Land Management's (BLM) issuance of authorizations for gas and oil pipeline rights-of-way when lands applied for are administered by more than one Federal agency. Also, the U.S. Department of Transportation appropriates national forest lands for states, counties, road districts, and others for rights-of-way for interstate and other Federal-aid highways. The Federal Energy Regulatory Commission issues all licenses for hydro-power projects involving Forest Service lands.

O. Forest Pest Management

The Forest Service pest management program has the responsibility for detecting, monitoring, evaluating, preventing and suppressing pest activity on forested lands in Arizona and New Mexico. This includes lands administered by Forest Service, the National Park Service (NPS), the BLM, Native Americans, the state, and private interests. Other parts of this program include technical assistance, support of special initiatives and the identification, development, and implementation of needed pest management technology. Detection, monitoring and evaluation activities may include: annual aerial insect and disease pest surveys; ground surveys; placement of pheromone traps for forest pests; and evaluation. Prevention and suppression activities include primarily Dwarf Mistletoe and insect suppression projects on Forest Service and Bureau of Indian Affairs Trust lands. Historically, there also have been treatments of trees with chemical or natural pesticides; although the most recent was in the early 1980's. Salvage logging of bark beetle infected trees also has occurred in the past, but little has occurred in recent years. Technical assistance involves informational input into resource management planning, training, and biological evaluations of pest occurrences.

P. Planning

Forest Service planning provides for informed resource management decisions, and may involve programmatic or project-level planning activities. Programmatic planning includes the maintenance of forest plans through public and other agency participation in the identification of issues and concerns, assessment of current conditions, determination of desired conditions, and in the development of standards and guidelines. Project-level planning is to be conducted within the bounds and constraints of the forest plans. This planning may involve proposals for action, analysis of issues surrounding the proposal, development of alternatives, and analysis of the effects of the proposed action and alternatives. Public participation also is a part of

project-level planning. Planning may also involve the review of landscape information conducted at forest facilities using maps, digital data, stand data, and models.

Q. Air Programs

Activities within the air program are intended to assure compliance with the Clean Air Act. These may include; the Forest Service's review of requests from outside sources seeking state approved emission permits to identify possible effects on Forest Service-managed Class I areas. If necessary, mitigation measures may then be prescribed. The Forest Service also may monitor Class I areas as a part of this program area, and place restrictions on Forest Service activities that produce smoke or dust.

R. General Administration and Public Information

General administration is solely administrative in function. This activity involves all of the Forest Service's administrative procedures including budgeting, payroll, personnel actions, and other miscellaneous administrative activities. These activities provide support to Forest Service personnel, who plan and execute Forest Service actions in all of the other areas discussed in this section of the biological opinion.

S. Law Enforcement

The Forest Service's Southwestern Region Law Enforcement and Investigations unit consists of 44 Law Enforcement Officers, 9 Special Agents, and 2 support personnel. The primary duty of this group is to patrol the national forest lands and enforce Federal laws within the national forests. The Federal laws that are enforced are designed to protect national forest employees, visitors, and resources. Felony investigations by six Special Agents in New Mexico and Arizona may involve loss to government property, natural resources, and cultural resources. Two Special Agents have supervisory roles in the two States while the support personnel provide administrative support.

IV. CONCURRENCE ON "NOT LIKELY TO ADVERSELY AFFECT" AND "NO JEOPARDY" FINDINGS

Section 7 regulations at 50 CFR 402.14(b) provide that a Federal agency need not initiate formal consultation if the agency determines, with the written concurrence of the Service, that the proposed action is not likely to adversely affect listed species or critical habitat. In their biological assessments, the Forest Service has made such determinations for a number of species. The Service here concurs with the Forest Service's determinations that the proposed action is not likely to adversely affect the following 13 species:

Bald eagle: Standards and guidelines in the LRMP's provide for direction to implement and enforce closures to protect nesting, perching, and roost sites.

Beautiful shiner: There are no known localities for this species on the national forests.

Black-footed ferret: There have been no recent records for this species in Arizona and New Mexico, and a discountably low likelihood exists that they will become re-established without purposeful re-introduction.

Bonytail chub: This species is not present on the national forests, and there is no known potential habitat for recovery.

Boreal toad: This species no longer occurs at historic localities on the Carson NF, and is considered extirpated from New Mexico.

Brown pelican: This species is only an occasional or accidental visitor to the Forest Service lands in Arizona and New Mexico.

Jaguar - U.S. population: Recent confirmed sightings of this species in the Peloncillo Mountains suggest that it is reasonable to expect at least the occasional presence of the species on the Coronado NF. The primary potential threat to the jaguar, however, is unlawful hunting, which is neither encouraged nor sanctioned by the Forest Service. Further, the Forest Service has signed an inter-agency conservation agreement that specifies protective measures for the jaguar.

Lee pincushion cactus: No current or historic sites on the national forests are known for this species. Any potential habitat is rugged and inaccessible.

Lloyd's hedgehog cactus: The Lincoln NF's biological assessment found that implementation of the LRMP direction has no effect on this species. The Service now believes that it is not a valid taxon and has proposed to remove it from the List of Endangered and Threatened Plants (61 Federal Register 30209; June 14, 1996).

Masked bobwhite: Forest Service lands are outside the natural range of the masked bobwhite.

Mexican gray wolf: Indigenous populations of gray wolf are considered extirpated in Arizona and New Mexico, even though there are rare unconfirmed sighting reports made, and there is a discountably low likelihood that wolves will re-colonize from Mexico (see discussion below regarding the Service's reintroduction proposal).

Mexican long-nosed bat: Although the Peloncillo Mountains may provide foraging habitat, there are no records of this species from national forests in Arizona and New Mexico.

Northern aplomado falcon: Although there are historic sightings from lands that are now a part of the Lincoln NF, re-colonization is not expected in the near future.

Ocelot: There have been no records of this species from Arizona and New Mexico since 1964.

Piping plover: This species is considered a rare spring migrant to the Cibola and Lincoln NF's. The playa lakes of the Kiowa National Grasslands are potential habitat, but presence of piping plovers has not been recorded.

Section 10(j) of the Act provides for the listing of nonessential experimental populations and directs that for section 7 consultation purposes they be treated as proposed species. Section 7 regulations at 50 CFR 402.10 require Federal agencies to confer with Service on any action that is likely to jeopardize the continuing existence of a proposed species. The Forest Service has made a determination, and the Service concurs, that the proposed action will not jeopardize the continuing existence of nonessential experimental populations of the: Black-footed ferret in Arizona; California condor; Colorado squawfish; Woundfin; and Mexican gray wolf (proposed for reintroduction in 1998 by the Service with designation as a nonessential experimental population.)

V. PREVIOUS SECTION 7 CONSULTATIONS

As indicated in Table 1, the eleven LRMP's, including amendments thereto, have undergone previous section 7 consultations. In addition, numerous projects and activities proposed by the Forest Service in the action area have undergone section 7 review since these LRMP's were adopted. The Service has not issued any jeopardy opinions for any LRMP's or their amendments, or for any specific projects or activities proposed under them (bearing in mind that Mexican spotted owl opinions are not addressed here), with the following exceptions: (1) A final jeopardy opinion was issued in 1988 regarding the effect of a proposed astrophysical site plan on the endangered Mount Graham red squirrel on the Coronado NF; and (2) a draft jeopardy and adverse modification of critical habitat opinion was issued in 1995 for the threatened spikedace on the West Bear and Del Rio grazing allotment management plans on the Prescott NF (this request for consultation was later withdrawn and is in informal consultation now). Thus, because projects may be improved during informal review processes such that a jeopardy opinion is avoided, with rare exceptions these 11 national forest LRMP's have not resulted in projects being approved by the Forest Service that jeopardize listed species or adversely modify critical habitat.

VI. AFFECTED SPECIES

The U.S. District Court for the District of New Mexico has issued a judgment that affects the critical habitat designations for the spikedace and loach minnow. On October 13, 1994, the

Court enjoined the Service from implementing and enforcing the final critical habitat designation for the spikedace and loach minnow until the Service complies with the provisions of the NEPA. In this biological opinion, the Service is not considering critical habitat for these two species in Arizona and New Mexico. The Service will treat these species as listed species, but will not consider their critical habitat as designated or proposed.

PLANTS

ARIZONA AGAVE (*Agave arizonica*)

Status of the Species (Range-wide)

Arizona agave is a perennial succulent listed as endangered without critical habitat. This species reproduces sexually only once within its lifetime; however, little is known about its reproductive success. Cattle have been observed to consume its inflorescences. The primary means of reproduction is vegetative through offsets. Individuals occur as isolated plants in proximity to *Agave chrysantha* and *Agave toumeyana* subsp. *bella* in the central Arizona area containing Yavapai, Gila and Maricopa counties. Fewer than 100 plants have been found in the wild.

Arizona agave is found in the transition zone between the oak-juniper woodland and the mountain mahogany-oak scrub woodland in shallow, cobbly to gravelly soils and rock outcrops (Hodgson and DeLameter 1988). Potential threats to the species include direct effects of grazing/browsing of inflorescences (Hodgson and DeLameter 1988) and trampling by livestock and wildlife, indirect effects of soil compaction as a result of livestock grazing, and predation by rodents and insects. Increased off-highway vehicle use could result in raising the seriousness of potential collection concerns owing to increased access. Additional impacts could occur from recreational activities along the Cave Creek Trail System and near Red Rover Mine. Mining activities are a potential threat as some claims and development occur in the New River Mountains.

Status of the Species (In the Action Area)

The entire known range of this species occurs on lands administered by the Cave Creek, Payson and Tonto Basin ranger districts of the Tonto NF, so the action area includes the entire species' range. Most of the plants occur on the Cave Creek Ranger District in the New River Mountains. Three other sites for the species occur near Rover Peak, near the town of Cave Creek, and in the Sierra Ancha Mountains near Parker Creek.

Formal (New River Allotment Management Plan, 1988) and informal (Bronco Allotment, 1990) consultations have been conducted for this species on two grazing allotments that contained the majority of the agaves. These resulted in seasonal restrictions on grazing and set-backs for water development and fencing. In addition, no prescribed burning or pesticide

applications are allowed in Arizona agave habitat. Fencing and transplantation efforts have protected many individual plants through a cooperative agreement between the Forest Service and the Desert Botanical Garden.

Effects of the Action

Forest Service program areas that could potentially impact the species or its habitat include range management, recreation, off-road vehicle management, fire management, and mining-related activities.

The LRMP for the Tonto NF includes standards and guidelines for protecting endangered and threatened species, including the Arizona agave. These standards and guidelines require survey, protection, management, and resolution of conflicts with other resource management.

Some Arizona agave clones have been fenced to protect them from grazing. Others are protected through restrictions on grazing during the agave's flowering season. The LRMP requires stocking adjustments as a result of surveys and reports.

The species occurs in relatively inaccessible areas where recreational activities are dispersed. Off-road vehicle use is prohibited where this species occurs, except in one area where other protections apply.

There is limited mining activity near the species' habitat. The LRMP requires that the Forest recommend no surface occupancy for leasing in sensitive areas, include endangered species habitat.

Fuels are reduced in areas occupied by the Arizona agave. The LRMP provides for use of prescribed fire to reduce fire hazard, and for suppression of wildfires. As a result of previous consultations, however, no prescribed burning is allowed in Arizona agave habitat.

Cumulative Effects

The known occurrences of this species are all on Forest Service lands. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction provided by the Tonto NF LRMP.

Conclusion

After reviewing the current status of the Arizona agave, the environmental baseline for the action area, and the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of the current management direction provided in the Tonto NF LRMP is not likely to jeopardize the continued existence of the Arizona agave. The Tonto NF LRMP provides general protections through standards and

guidelines for endangered and threatened species and range management. The combination of the general direction and the exclosures and restrictions on grazing in the key areas have reduced the vulnerability of this species.

Conservation Recommendations

1. The Forest Service should assess the need to implement enhanced enforcement against illegal collecting.

2. Provide specific protection from direct and indirect effects of grazing by adjusting allotment management plans to provide exclusion areas large enough to allow for expansion of Arizona agave clones and populations.

3. Provide specific direction in fire management plans to ensure exclusion of cattle from Arizona agave habitat following fire.

ARIZONA CLIFFROSE (*Purshia subintegra*)

Status of the Species (Range-wide)

Arizona cliffrose is a woody shrub listed as endangered without critical habitat (USDI 1984). The Recovery Plan for this species has a complete discussion of its taxonomic distinctness and habitat characteristics (USDI 1995). This species has narrow habitat requirements and occurs in four widely separated areas in central Arizona: near Bylas in Graham County; the Horseshoe Lake vicinity in Maricopa County; near Burro Creek in Mohave County and; in the Cottonwood/Verde Valley area in Yavapai County. These sites differ slightly in elevation and associated vegetation, but all sites share limestone soils that can be white or reddish in color. These soils are derived from Tertiary lakebed deposits, and at each site Arizona cliffrose is part of a locally unique vegetation community (Anderson 1993).

Each of the four populations are genetically variable (Mount and Logan 1992). Discussions on the prevalence of certain distinguishing morphological characteristics and the species' apparent phenotypic plasticity are provided by Reichenbacher (1985, 1987, 1992), Schaack and Morefield (1985), and Phillips and Phillips (1987). The largest population of this species is found in the Verde Valley area; this is the only population where successful seedling establishment leading to population recruitment is presently known to occur. Land ownership includes the Forest Service, BLM, Arizona State Parks, Arizona State trust lands, and numerous private parcels. Activities within these lands that pose varying degrees of potential threat to Arizona cliffrose include grazing/browsing by livestock, feral animals, and wildlife, mining and mining-related activities, construction of roads, utility corridors and urban development, and recreational activities and off-highway vehicle use. This species is a palatable shrub and receives moderate to heavy grazing pressure when exposed to ungulate

herbivores, particularly in close proximity to water sources and trails (Bingham, 1976; Phillips et al. 1980; Reichenbacher 1989). Mining activities are of a particular concern to the Burro Creek area. Expanding urbanization and its associated infrastructure development is a serious concern within the Verde Valley. Off-highway vehicle activities threaten all but the Bylas population (USDI 1995).

Status of the Species (In the Action Area)

The Coconino NF established the Verde Valley Botanical Area in 1987 (USDA 1987) to emphasize management practices needed to protect and preserve the unique desert community that contains Arizona cliffrose. This special management area includes an estimated 50-60 percent of the Verde Valley area population. An additional 10-20 percent of this population occurs on Forest lands outside the Botanical Area. The Horseshoe Lake population on the Tonto NF includes three small subpopulations.

Effects of the Action

All potential threats described above under "Status of the Species (Range-wide)" occur on Forest lands, although the primary potential threats associated with mining occur near the Burro Creek population. Forest Service program areas that could potentially cause adverse effects to Arizona cliffrose or its habitat include range management, recreation, off-road vehicle management, realty actions, mining, fire management, and construction activities. Activities in these programs must conform to general LRMP protections for endangered and threatened species.

Formal and informal consultations with the Coconino NF have addressed the program areas of range, recreation/off-highway vehicle use, realty actions, and construction activities. The Tonto NF has not consulted on activities causing impacts to Arizona cliffrose. These activities include grazing, mining, and recreational uses. The latter program area is the only area the biological assessment on the Tonto NF LRMP identifies as likely to adversely affect the species. This is because the LRMP calls for recreation site construction in the vicinity of one of the three cliffrose populations at Horseshoe Lake. Further recreational site development may concentrate visitors in and increase the likelihood of damage to plants. However, this is within a small portion of the species' range and the general protections for threatened and endangered species provide an adequate basis for making the needed modifications to minimize potential adverse effects. The Arizona Cliffrose Recovery Plan (pages 45-46) notes the protections and recovery contributions attributable to the Tonto and Coconino NF LRMP's. In particular, the establishment of the Verde Valley Botanical Area on the Coconino NF resulted in additional protection for a large portion of the Arizona cliffrose population beyond the general protections provided in the LRMP's for endangered species.

Cumulative Effects

The range of the species includes Arizona State Land Department trust lands and private lands. Activities that affect private lands are associated with continuing urbanization, especially in the Verde Valley, and many of the same activities that affect the species on the national forests. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction provided by the LRMP's.

Conclusion

After reviewing the current status of the Arizona cliffrose, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the Arizona cliffrose. The LRMP's offer general protections for endangered and threatened species, and the Forest Service's establishment of the Verde Valley Botanical Area has contributed significantly to the security of the species.

Conservation Recommendations

1. Significant measures to promote recovery have been taken by the Coconino NF. The Arizona Cliffrose Recovery Plan should be similarly be implemented on all other national forests within the historic range of the species, including surveys to define the range of the species on other NF's.

2. The Forest Service should assess the need to implement enhanced enforcement against illegal collecting.

3. Review grazing allotments within the range of the Arizona cliffrose and assess possible impacts on the species.

ARIZONA HEDGEHOG CACTUS (*Echinocereus triglochidiatus* var. *arizonicus*)

Status of the Species (Range-wide)

The Arizona hedgehog cactus was described by Benson (1982). It was listed as an endangered species without critical habitat on November 26, 1979 (44 FR 61556). The previously known range of the species includes the Pinal, Dripping Springs, Superstition, and Mescal mountains in central Arizona. Within this distribution, Cedar Creek Associates (in Tonto NF 1996), using all available distribution and ecological data, estimated that Arizona hedgehog cactus

occupies approximately 18,900 acres (30 square mi) of habitat. A population was recently discovered on the Apache-Sitgreaves NF on the Clifton Ranger District.

Arizona hedgehog cactus habitat consists of exposed bedrock or boulders within Interior Chaparral, Madrean Evergreen Woodland, and Desert Grassland plant communities within an elevation range of approximately 3,400 to 5,300 feet. This habitat is characterized by rugged, steep-walled canyons, and boulder pile ridges and slopes. Typically, the cactus is scattered on open, rocky exposures, rooting in shallow soils and narrow crevices among the boulders (Phillips et al 1979, USDI 1979, USDI 1985). The species may be found beneath the understory of shrubs, but moderate to high shrub densities and associated deeper soils tend to preclude the cactus (Tonto NF 1996). Substrates on which the cactus are normally found include Orthoclase-rich granite of late Cretaceous age, primarily Schultze Granite; mid-Tertiary age Dacite; and to a lesser extent in Pinal Schist (AGFD 1994, Tonto NF 1996).

The Arizona hedgehog cactus begins to produce flower buds in early April with flowering from late April to mid-May. Weather conditions can hasten, prolong, or delay flowering by several weeks (AGFD 1994). The pollination ecology of the species is largely unknown, but it is an obligate outcrosser. Likely pollinators include insects, primarily bees, and perhaps hummingbirds (Ferguson 1989). Seed dispersal is suspected to be by birds and mammals (Tonto NF 1996). Natural insect predators include borers and leaf-footed bugs (Coreidae) which attack the stems. Rodents may gnaw on stems and eat the fruits, which may also contribute to dispersal. Root rot may also be an important cause of mortality (Crosswhite 1976, Phillips et al. 1979).

Status of the Species (In the Action Area)

The Tonto NF, Globe Ranger District, manages approximately 90 percent of the known occupied habitat of species. This cactus also occurs on Arizona State Land Department trust lands, BLM administered lands, and private lands. A substantial population of the cactus is found within the Superstition Mountain Wilderness Area (Tonto NF 1996). Direct access to a large portion of the cactus' range is very limited due to the rugged topography and remote nature of these habitats. Cedar Creek Associates (1994, and in Tonto NF 1996) has estimated that there are over 250,000 individual Arizona hedgehog cactus plants. This estimate is considered to be conservative because it does not include up to several thousand plants occurring in satellite populations disjunct from the main distribution of the species, and actual sample counts tend to under-count smaller plants. The Apache-Sitgreaves NF, Clifton Ranger District, populations were recently discovered. The full extent and trend of the cactus in this area is not yet known.

This species has horticultural value and is commercially available from cactus and succulent dealers. Illegal collection of the species plants has been identified as a primary potential threat to the species (USDI 1979). Removal of plants may occur for landscaping or for suspected hallucinogenic purposes. The extent of possible collection pressures remains uncertain.

Comparisons of isolated and roadside populations suggest there may be diminished population levels at easily accessible sites. Those plants most susceptible to collection would be those that could be easily dislodged from the soil rather than those growing within the rock matrix. However, as part of the intensive surveys conducted within the project area by Cedar Creek Associates (1994, and *in* Tonto NF 1996), including portions of the Highway U.S. 60 corridor, reduced densities along the highway were not discernable when compared with plant densities from more remote locations. Seed collection is also a potential threat. The effect of collecting of plants and seeds may have on the long-term reproduction and survival of the species is not known (USDI 1985). However, any effects would be expected to be site-specific. If there is a major change in the market demands for the species, it could result in substantive impacts to the cacti.

Construction of Highway U.S. 60 and its later realignment destroyed individual cacti and their habitat. Cedar Creek Associates (1994) estimated that 2,348 cacti were lost from approximately 67 acres of presumed occupied habitat, and an additional 85 acres of presumed unoccupied but potential habitat was eliminated by highway construction. These estimates were based on habitat characteristics, including vegetation type, topography, and parent geologic material of adjacent sites and the recorded densities if the species in similar habitats. The construction of power lines parallel to the highway and the Silver King substation for the Salt River Project resulted in the loss of an additional 18 acres of occupied habitat. (Cedar Creek Associates 1994). Six plants were removed and transplanted by Boyce Thompson Arboretum in 1978 to permit construction of the Silver King substation (Phillips et al. 1979).

Effects of the Action

Potential threats to the species on the Forest include habitat destruction by mining (and mineral exploration), facilities and transportation route construction, and range management . Additional potential threats to the cactus include wildfire, illegal collecting, and herbicide and pesticide application (USDI 1979, USDI 1985, AGFD 1994).

Livestock grazing may result in direct trampling of plants and habitat degradation. Physical damage to cacti by livestock has been documented (Tonto NF 1996). However, Cedar Creek Associates (1994) notes that plants damaged by livestock are observed primarily in those areas most accessible to livestock, and, in active pastures, occur at a rate of approximately one out of every 400 to 500 plants observed. Habitat degradation from livestock grazing, which resulted in impacts to species, has not been documented. Damage and direct herbivory by javelina appears to be frequent and widespread (Tonto NF 1996).

The greatest potential threats to the species are mining and related activities (USDI 1979). Within the Globe-Miami-Superior area, major mining operations in or adjacent to Arizona hedgehog cactus habitat are currently being conducted by Magma, Cyprus, and Carlota Copper. Other smaller mines and mining claims occur within and at the periphery of the range of the cactus. Although the surface geology of the habitat is not well mineralized, potential

subsurface mineral deposits may warrant test drilling in certain locations within occupied habitat, mining claims have been filed. Roads to provide exploration access and exploratory drilling for underlying deposits are a potential threat to the species even though these roads often detour around the prime Arizona hedgehog cactus habitat of rocky outcrops. The amount of potential disturbance from mining is dependent on whether a mine is open pit or shaft, and how much surface area (of occupied or potential habitat) will eventually be covered by tailings (USDI 1985). Cedar Creek Associates (1994) estimated that the Magma and Cyprus operations eliminated approximately 2,195 acres of potential habitat. There is no evidence, based on post-project surveys, that either plants or occupied habitat were directly lost to either of these mining operations.

The Tonto NF has projected that the amount of habitat occupied by the species will remain stable for the life of the LRMP. The LRMP provides that the Service shall "correct management conflicts" in Arizona hedgehog cactus range. Although potential threats exist, the population size is relatively large, the overall status of the species is rated as excellent, and much of the range is inaccessible in wilderness, on steep slopes and other areas. The Apache-Sitgreaves Forest population is not considered threatened by grazing, mining, or fire management, although further research is needed. With an estimated more than 250,000 individual plants and adequate protections in place, the species does not appear vulnerable to projects and actions that will threaten its survival and recovery.

Cumulative Effects

Less than 10 percent of the known habitat occurs on Arizona State Land Department trust lands and private lands. These lands are likely subject to many of the same activities that affect the species on the national forests. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction provided by the LRMP's.

Conclusion

After reviewing the current status of the Arizona hedgehog cactus, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the Arizona hedgehog cactus. Despite a variety of potential impacts of Forest Service activities, the large population size and occurrence of many plants in wilderness and other inaccessible places that reduce the plant's vulnerability, as well as the LRMP protections in place, indicate a low likelihood that the LRMP's would result in projects or actions that would jeopardize the species' likelihood of survival and recovery.

Conservation Recommendation

The Forest Service should assess the need to implement enhanced enforcement against illegal collecting.

CANELO HILLS LADIES'-TRESSES (*Spiranthes delitescens*)

Status of the Species (Range-wide)

The Canelo Hills ladies'-tresses, listed as an endangered species without critical habitat, is an orchid known from five sites in cienega and streamside habitats within the San Pedro River watershed in Santa Cruz and Cochise counties, Arizona. These sites occur in habitats where scouring floods are unlikely and soils are highly organic and saturated. Management of the sites is complex due to a lack of understanding regarding the possible roles of fire or other types of disturbance in the system. The five sites for this orchid occupy less than 200 acres of habitat near the U.S./Mexico border. Four of the five sites occur on private land; the fifth site (consisting of four individuals) occurs on forest lands. Primary potential threats to this species include a number of activities that result in wetland habitat degradation such as groundwater overdrafts, surface water diversions, impoundments, channelization, improper livestock grazing, agriculture, mining, invasive exotic species and recreation. Although the Service's preliminary finding in the rule to list the species is that well-managed livestock grazing does not harm the populations, management cannot accurately be assessed in the absence of monitoring. This orchid is also potentially threatened by collection (as most orchids are). The limited distribution and low numbers of individuals of this species leave it very vulnerable to extinction from stochastic events. Although not an immediate threat, future subdivision and development of private lands in the San Rafael Valley are also potential threats.

Status of the Species (In the Action Area)

The recently discovered site for this orchid on the Coronado NF is the only site under Federal management. This site is located downstream of a previously known population, and is within a cattle grazing allotment. The biological assessment states that the site has received periodic, heavy grazing in the past.

Effects of the Action

Forest Service program areas that could potentially adversely impact the species or its habitat include range management and soil and water management.

The LRMP identifies watershed condition as a priority in the management area that includes this species. Standards and guidelines direct site restoration if riparian or cienega habitat is found to be in a degraded condition.

Range management has the most significant effect on this orchid at this time. The site on the Coronado NF is located within an allotment allowing for use of riparian areas by cattle. The Forest notes that this area receives periodic heavy use by cattle and that this stream is the only water source available in the "pasture." The biological assessment suggests that some level of grazing may be beneficial to the plant by reducing competing grasses, sedges, and other riparian species. A recent inspection of the locality on the Coronado NF determined that heavy streamside damage had occurred following heavy grazing. In order to protect the orchid and other riparian resources, the Coronado NF has removed cattle from the pasture that includes orchid habitat until a fence can be completed to protect the species.

Cumulative Effects

One population occurs within the Canelo Hills Cienega Preserve. Impacts on other populations on private lands are unknown. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction provided by the Coronado NF LRMP.

Conclusion

After reviewing the current status of the Canelo Hills ladies'-tresses, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the Canelo Hills ladies'-tresses. Although grazing is the activity that appears to have the greatest potential to affect the species on Forest Service lands, the species has been able to survive in the presence of sometimes heavy grazing. Whether some level of grazing actually enhances conditions for the Canelo Hills ladies'-tresses needs to be determined. The only population known on Forest Service lands has been protected following LRMP direction to address sources of riparian degradation.

Conservation Recommendation

The Forest Service should develop and implement a monitoring or experimental grazing plan to better define the effect of grazing on the species.

HOLY GHOST IPOMOPSIS (*Ipomopsis sancta-spiritus*)

Status of the Species (Range-wide)

Holy Ghost ipomopsis was listed as endangered without critical habitat on April 22, 1994. It is known from a single population that occupies approximately 2.2 mi of Holy Ghost Canyon in the Sangre de Cristo Mountains. There are approximately 200 acres of occupied habitat. The species is a biennial or short-lived perennial that grows as a rosette for 1 to several years,

then flowers once and dies. The rosettes are indistinguishable from the closely related scarlet gilia (*Ipomopsis aggregata*), which also grows in the area, so accurate population counts are difficult. The population is estimated at 1,500-2,500 plants. Holy Ghost ipomopsis occurs on relatively dry steep slopes in openings of Rocky Mountain montane conifer forest. It appears to grow best on bare mineral soils and reaches it highest densities on disturbed sites such as road cuts.

Status of the Species (In the Action Area)

Holy Ghost ipomopsis occurs on the Pecos Ranger District of the Santa Fe NF and to a minor extent on private inholdings. The canyon occupied by Holy Ghost ipomopsis is used for recreation with a Forest Service campground and numerous summer homes on leased Forest Service land. Picnicking, hiking, fishing, and sightseeing are the main recreational activities. The area is excluded from logging and cattle or horse grazing. The area has not been logged, and fire suppression has led to the accumulation of fuels, making the area vulnerable to catastrophic fire. Nonnative grasses introduced for erosion control and livestock forage occupy some Holy Ghost ipomopsis habitat. These grasses are now completely naturalized and their elimination or even reduction would be almost impossible.

Effects of the Action

Holy Ghost ipomopsis is adapted to forest openings that were formerly created by frequent natural fires. Fire suppression has reduced the frequency of this natural disturbance; areas of human disturbance such as road cuts now substitute for natural habitat. Road construction and maintenance can create new habitat, but could also damage or destroy the present population. The resurfacing of Forest Road 122 prior to the species' proposal for listing destroyed a number of plants. An attempt to move these plants to a new locality was unsuccessful.

Holy Ghost ipomopsis is presently at greatest risk from catastrophic fire that could be hot enough to sterilize the soil seed bank. Recreation activities are a minor potential threat. The use of *Bacillus thuringiensis* to control spruce budworm infestations has the potential to kill nontarget lepidoptera that pollinate Holy Ghost ipomopsis. The Forest Service has indicated, however, that there are no plans for pesticide activities on this part of the Santa Fe NF.

According to the biological assessment on the Santa Fe NF LRMP, the Forest Service has developed a recovery strategy specifically to protect this species until a recovery plan is completed by the Fish and Wildlife Service. The strategy includes development of a fire management plan, study of the effects of fire, development of educational materials, and other actions. These will preclude actions, except a catastrophic fire beyond human control, that would appreciably reduce the likelihood of the species' survival and recovery.

Cumulative Effects

A minor portion of the population occurs on private inholdings within the Santa Fe NF. Activities associated with residential use of these inholdings could have impacts on the ipomopsis, but they could also reduce fire risk to the population because people in residential areas tend to reduce the accumulation of forest fuels. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction provided by the Santa Fe NF LRMP.

Conclusion

After reviewing the current status of the Holy Ghost ipomopsis, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the Holy Ghost ipomopsis. In developing a recovery strategy that includes development of a fire management plan and effects study, the Forest Service has developed guidance to address the primary potential threat to the species: catastrophic fire.

Conservation Recommendation

The Forest Service should assess the need to implement enhanced enforcement against illegal collecting.

HUACHUCA WATER UMBEL (*Lilaeopsis schaffneriana* subsp. *recurva*)

Status of the Species (Range-wide)

The Huachuca water umbel is an aquatic to semiaquatic, herbaceous perennial that is endemic to cienega and riparian habitats. It is listed as endangered without critical habitat.. A complete description of the plant and its associated habitat may be found in the final rule listing the species. The habitat is associated with the following factors: perennial water, saturated, organic soils (although at some sites it occurs on floating hummocks of vegetation), periodic flooding of low intensity, and little to no stream entrenchment in riparian areas with low stream gradients.

Huachuca water umbel occurs at 21 total sites in Santa Cruz and Cochise counties within the Santa Cruz, San Pedro, Cienega Creek, Rio Yaqui, and Rio Sonora watersheds on Forest Service, BLM, Department of Defense, Nature Conservancy and other private lands. Populations also occur in adjacent Sonora, Mexico. Potential threats to the species include activities that contribute to wetland habitat degradation and loss, such as groundwater overdrafts, surface water diversions or impoundments, channelization, poor range management

practices, mining, road construction, agriculture, nonnative species introductions, urbanization and recreation. Growing water demand threatens the existence of southern Arizona perennial surface water and the species that depend on that water.

Status of the Species (In the Action Area)

Three populations of Huachuca water umbel are presently known to exist on the Coronado NF in the Huachuca Mountains. Two of these sites have been monitored since 1989 and have demonstrated fairly stable frequencies and stream extent. The Forest is proposing a land exchange that would transfer some habitat at these three sites into private ownership, although the majority of the contiguous habitat would remain national forest lands. In return, the Forest would gain private lands with five additional sites containing Huachuca water umbel. The grazing permittee is also the land manager for the private lands offered, so management of the sites is not expected to change significantly.

Effects of the Action

Severe overgrazing can degrade habitat to an extent that increases the threat of scouring floods, as occurred near San Bernardino National Wildlife Refuge in 1988. Well-managed grazing appears to be compatible with the species' existence. Groundwater demands are perhaps the greatest potential threat, but this is a regional problem that the Forest Service has only limited authority to address.

Realty direction in the LRMP can increase protection for the species through acquisition of additional habitat. Ongoing efforts for land exchange should increase the net amount of habitat in Federal ownership.

Activities promoted and provided for under the Coronado NF LRMP, in particular in the areas of recreation, fire management, and minerals development, potentially could affect the Huachuca water umbel. On the other hand, general protective standards and guidelines exist for endangered species in the LRMP and specific protections exist for unique vegetation in Bear Canyon, one of the three national forest sites. The fact that a small portion of the total plant population occurs on the Coronado NF, in combination with the relatively low likelihood of harm occurring to the three populations on the national forest by projects approved under the Coronado NF LRMP, indicates that species' likelihood of survival and recovery is not appreciably reduced by the LRMP. Planned land exchanges are likely to provide a net benefit to the species. Although grazing is the Forest Service activity that appears to have the greatest potential to affect the species on Forest Service lands, the species appears to tolerate some grazing. The potential threat of grazing activities, which is provided for in the LRMP, is of concern in providing for the recovery of the species, but is not sufficient to find that the LRMP would jeopardize the continuing existence of the species.

Cumulative Effects

Most Huachuca water umbel populations are on non-Forest Service land. Land exchanges are planned to increase the number of populations on public land. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction provided by the Coronado NF LRMP.

Conclusion

After reviewing the current status of the Huachuca water umbel, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the Coronado NF LRMP is not likely to jeopardize the continued existence of the Huachuca water umbel. Planned land exchanges are likely to provide a net benefit to the species. Although grazing is the Forest Service activity that appears to have the greatest potential to affect the species on Forest Service lands, the species appears to tolerate some grazing. The potential threat of grazing activities, which is provided for in the LRMP, is of concern in providing for the recovery of the species, but is not sufficient to find that the LRMP would jeopardize the continuing existence of the species.

KUENZLER HEDGEHOG CACTUS (*Echinocereus fendleri* var. *kuenzleri*)

Status of Species (Range-wide)

The Kuenzler hedgehog cactus was listed as endangered without critical habitat on October 26, 1979. Plants grow between rocks on gently sloping limestone outcrops in piñon-juniper woodlands at 5,800-6,600 ft elevation on the eastern slope of the Sacramento Mountains in northeastern Otero and adjacent Chaves and Lincoln Counties, New Mexico. Plants tend to occur in small populations or as scattered individuals. Some past observations indicate winter frost damage to this cactus is decreased when healthy stands of grass provide protective cover.

Status of the Species (In the Action Area)

Plants occur on national forest, BLM, state, and private lands. The largest known population occurs at Fort Stanton on land administered by BLM. The Lincoln NF has recorded 145 plants at 19 sites. These sites occur at three general locations on the Forest. Populations appear stable. The likelihood that additional populations will be discovered is high because there is abundant suitable habitat, although plants are difficult to find. An experiment that involves clipping grass to mimic the effect of heavy grazing is being conducted on BLM land at Fort Stanton. Illegal collecting is a potential threat to this species. Forest Service personnel observed that all large plants were removed from two sites in the early 1980's. Relatively few

occurrences of illegal collecting have been documented recently; the present extent of illegal collecting is unknown, but believed to be much reduced from that of previous years.

Effects of the Action

Forest Service activities that may affect Kuenzler hedgehog cactus include fuelwood sales in the plant's piñon/juniper habitat, grazing, road construction, and fire management.

Fuelwood sales in occupied habitat could detrimentally affect plants through mechanical damage from harvest activities. However, no long-term effects should occur because known populations of the cactus are in areas of sparse tree cover, where little fuelwood cutting occurs. Intensive grazing is potentially detrimental, although this has not been conclusively demonstrated. Such activities as road construction or establishment of utility or pipeline corridors could directly damage plants and provide access for illegal collecting. The overall effect of fire on Kuenzler hedgehog cactus is unknown, although the short-term effect is expected to be detrimental.

The Lincoln NF LRMP includes a number of protective provisions for endangered species and the LRMP specifically references the cactus as a species to which the protections apply. These provisions, designed to reduce impacts of Forest activities on the species, include requirements such as: prohibiting herbicide spraying in the area, planning for the species' requirements in grazing management, and prohibiting disturbing activities (including public use) as necessary. The LRMP also directs that the Lincoln NF should be managed in accordance with Recovery Plans for endangered species. The Kuenzler hedgehog cactus Recovery Plan was approved in 1985.

The sum of these protections should preclude project designs and actions that would reduce the likelihood of survival and recovery of the Kuenzler hedgehog cactus.

Cumulative Effects

The same activities that affect the species on NF's are potential threats on private lands. Section 9 take prohibitions do not protect plant species on private lands from collecting, except when violation of certain state laws occurs. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction provided by the Lincoln NF LRMP.

Conclusion

After reviewing the current status of the Kuenzler hedgehog cactus, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the Kuenzler hedgehog cactus. The Forest

Service manages a relatively small proportion of the species' range on Federal land. This population appears to be stable and adequate specific protections are in place in the Lincoln NF LRMP, and in the approved Recovery Plan, so as to preclude harmful actions within the Forest Service's control.

Conservation Recommendation

The Forest Service should assess the need to implement enhanced enforcement against illegal collecting.

PARISH'S ALKALI GRASS (*Puccinellia parishii*)

Status of Species (Range-wide)

Parish's alkali grass was proposed for listing as endangered without critical habitat on March 28, 1994. When proposed for listing, it was known from nine total sites in Arizona, California, and New Mexico. Since the proposal, 15 additional sites have been discovered; there are now eight known sites in Arizona, one in California, and 15 in New Mexico. Parish's alkali grass is a dwarf, ephemeral, winter-to-spring, tufted annual. The leaves are 1-3 cm (0.4-1.2 in) long, firm, upright, and very narrow. Flowering stems are 2-20 cm (0.8-8 in) long, number 1-25 per plant, and appear from April to May. Plants grow from about March through June, but can only be positively identified during the flowering period. Plants die during the typically dry southwestern spring. By mid-July, there is usually no sign of plants at occupied sites.

Parish's alkali grass occupies a very specific habitat of alkaline springs and seeps that occur at the heads of drainages or on gentle topography at elevations of 800-2,200 m (2,600-7,200 ft). The amount of available habitat depends on the size of the spring and can vary from a few square meters to 16 ha (40 ac). The species is dependent on continuously damp soils during its late-winter to spring growing period. The number of plants in a population can fluctuate widely from year-to-year in response to growing conditions. Parish's alkali grass often grows associated with *Distichlis picata* (salt grass), *Sporobolus airoides* (alkali sacaton), *Carex* spp. (sedge), *Scirpus* spp. (bulrush), *Juncus* spp. (rush), *Eleocharis* spp. (spike rush), and *Anemopsis californica* (yerba mansa).

The geographic range of Parish's alkali grass extends about 1,000 km (600 mi) east to west from Sandoval County, New Mexico, to San Bernardino County, California, and about 500 km (300 mi) north to south from San Juan County, New Mexico, to Hidalgo County, New Mexico. Parish's alkali grass is currently known from 24 sites. Because of the extensive range of this species, its small size, and the short period during which positive identification is

possible, it is believed the species may be seriously under-represented in herbarium collections. The additional discoveries of the plant since the listing proposal tend to support this conclusion.

Status of the Species (In the Action Area)

Parish's alkali grass occurs mostly on BLM, tribal, and private lands. One population was found on the Apache/Sitgreaves NF's in the spring of 1997. Other suitable habitat likely exists around some springs at lower elevations in some of the NF's in Arizona and New Mexico. The habitat at all known sites for Parish's alkali grass has been highly modified through capture of water for livestock, agriculture, or intensive grazing. Some occupied spring sites are severely degraded by cattle, a condition that has existed for decades, yet the plants persist. De-watering of springs rather than spring degradation appears to be the major potential threat to the species.

Effects of the Action

Suitable habitat for Parish's alkali grass may be affected by Forest Service grazing programs and by soil and water management activities that affect water quantity of alkaline springs and seeps.

Recent discoveries indicate that Parish's alkali grass is more common than indicated by earlier data. Also, there are indications from the newly discovered populations that Parish's alkali grass may be able to occupy a somewhat broader range of habitats than previously thought. Although the Service agrees that the majority of desert springs in the Southwest have been modified for various uses, some of the newly discovered populations cast doubt on the negative effects of livestock. Severe overgrazing and trampling have occurred for decades at several springs where Parish's alkali grass is present; there is speculation that disturbance around springs may actually reduce competition from other, more edible, plants and create open microsites that benefit this small annual grass.

Projects to protect spring sources and improve them for both wildlife habitat and livestock water will also impact Parish's alkali grass habitat, again with uncertain results for the species. Any program such as salt cedar control or piñon-juniper removal that may increase spring water has the potential to improve or increase habitat for Parish's alkali grass. Because of the lack of plants confirmed on NF's, the continuation of management direction under the LRMP's should not appreciably reduce the likelihood of survival and recovery of this species. The LRMP's include general protective measures that would apply if the species presence were confirmed.

Cumulative Effects

Localities on private and tribal lands are subject to livestock grazing or crop farming. Any private, tribal, and state activities in the national forest action area that may affect potentially suitable habitat, and that would require a Forest Service permit, would require review by the Forest Service under the direction provided in the LRMP's.

Conclusion

After reviewing the current status of Parish's alkali grass, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's conference opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of Parish's alkali grass. Recent discoveries of additional populations indicate that the species is probably more secure than believed at the time of its proposal for listing. Even if found on Forest Service lands, it appears to tolerate grazing, which is a likely use of any previously unknown alkaline spring habitat.

PIMA PINEAPPLE CACTUS (*Coryphantha scheeri* var. *robustispina*)

This is one of the seven species for which additional management direction and a supplemental biological assessment has been provided by the Forest Service during the consultation process.

Status of the Species (Range-wide)

Pima pineapple cactus (*Coryphantha scheeri* Kuntz var. *robustispina* Schott) is listed as endangered, without critical habitat. The species is known from Santa Cruz and Pima counties in Arizona and northern Sonora, Mexico. The cactus is hemispherical, with adults measuring 4 to 18 in. tall and 3 to 7 in. in diameter. The diagnostic character for the cactus is the presence of one stout central spine, usually hooked at the tip. The number of radial spines is variable, usually between 6 and 15. The cactus grows near alluvial basins and on hillsides and ridges in desert scrub/grassland, at elevations ranging from 3,000 to 4,200 ft. Plants have not been located on steep slopes, but are associated with landforms at slopes less than 15 percent. The relationship with soil type is not well documented, but they seem to be associated with silty to gravelly deep alluvial soils.

The range of the cactus, as described in the final rule, is east from the Baboquivari Mountains to the western foothills of the Santa Rita Mountains. The southern boundary is not well defined because extensive searches for the plant in Mexico have not been undertaken. The majority of occupied habitat occurs off national forest land, mainly in the Green Valley area. The major potential threats to the cactus are from urbanization of Green Valley, mining and

construction of the Central Arizona water project. The Coronado NF does have additional potential habitat, but it is restricted to the lower slopes of the Santa Ritas, Tumacacori and the southern portion of the Patagonia Mountains.

There is a lack of information regarding the biology of this species. Little is known of its life history or historic distribution. It occurs in Sonoran desert grasslands, usually associated with ocotillo, mesquite, and various grass species. It tends to occupy soils that are well drained, with a clay component. It is not associated with rock outcrops or granitic soils. There is circumstantial evidence that the cactus could be indirectly affected by the change in grass species composition that has occurred in some areas in the recent past (USFWS 1993). Many areas have been influenced by the spread of the nonnative Lehmann's lovegrass (*Eragrostis lehmanniana*). This may create a situation where plants would be more susceptible to damage from wildfire. Heavy concentrations of Lehmann's lovegrass would generate hotter fires than natural concentrations of native perennial grasses, thereby subjecting the cacti to hotter, more intense, fires capable of killing the plants.

Urbanization, mining, and water development are potential threats to the continued existence of this cactus. The majority of this plant's distribution occupies private land with no nexus to Federal regulation under the Act. Therefore, minimal demographic information is available for most of the plant's range. However, between December 1993 and December 1994, from residential development alone, 509 plants were removed to ex-situ locations and at least 503 acres (203 ha) were lost. Unreported losses on other private lands are likely. When habitat is lost to these activities, remaining occupied habitat becomes more fragmented, which may influence reproduction in this cross-pollinating plant.

Status of the Species (In the Action Area)

There is a record in the AGFD Heritage Database of a cactus in the southern Patagonia Mountains of the Coronado NF (AGFD 1991). The Forest Service has conducted extensive surveys in this area and a total of 56 plants have been documented from the Patagonias. There are also two cacti along the western front of the Santa Rita Mountains, on the Nogales Ranger District. In 1997, additional cacti were located along the alluvial benches of the Tumacacori Mountains. This brings the total number of plants on the Forest to at least 58. Basically, three sites for Pima pineapple cactus are found on the Coronado NF; this is a small portion of the total species' range and population.

Effects of the Action

The programs that most affect Pima pineapple cactus are range and fire management, off-road vehicle management, and recreation.

Very little information is available concerning the effects of grazing on Pima pineapple cactus distribution. Currently, a study begun as a condition in a consultation has been established to

monitor the effects on the Coronado NF. Grazing practices are quite variable, and the Pima pineapple cactus's distribution is patchy and widely dispersed and occupies soils that are not often utilized by livestock in moderately under-utilized pastures (i.e., these plants do not inhabit areas near water tanks or stream banks). Areas that are overgrazed may threaten Pima pineapple cactus populations by increasing the probability of trampling and significantly altering the hydrology in areas currently supporting Pima pineapple cactus. New direction for management of the cactus includes a provision to consult on grazing allotments in occupied habitat. These allotments have now completed formal consultation.

Problems with Lehman's lovegrass and fire risk mean that the range and fire management programs may have synergistic effects on the cactus. New direction requires that occupied pima pineapple sites be protected from wildfires and wildfire suppression activities. It also directs that fuel loading be reduced on occupied sites, which should reduce the threat of wildfire.

Potential recreational impacts can result from camping and use of off-highway vehicles in cactus habitat. New direction addresses these threats by restricting off-highway vehicles from habitat, with monitoring for the effectiveness of the closure.

The additional management direction provided by the Forest Service in the supplemental biological assessment to protect the species should preclude foreseeable projects and activities that could cause a reduced likelihood of its survival and recovery. The additional restrictions on off-highway vehicle use, the measures to reduce fire mortality, the commitment to consult on grazing allotments, and other provisions address the key potential threats under Forest Service control.

Cumulative Effects

Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction of the Coronado NF LRMP.

Conclusion

After reviewing the current status of the Pima pineapple cactus, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the Coronado NF LRMP, as supplemented by the new management direction, is not likely to jeopardize the continued existence of the Pima pineapple cactus. The key potential threats have been addressed by additional management direction issued under general LRMP direction to protect endangered and threatened species.

Conservation Recommendations

1. With respect to the Alisos Allotment:

   a. Locate and map sites occupied by Pima pineapple.

   b. Enlarge the grazing exclosure to include a greater number of individuals of the species, if the enlargement will provide increased protection.

   c. Provide for low-impact fencing to prevent off-highway vehicle traffic if monitoring indicates that vehicle restrictions are being violated.

2. To reduce the risk of fire involving Lehmann's lovegrass, do not allow campfires in the vicinity of Pima pineapple cactus habitat.

SACRAMENTO MOUNTAINS THISTLE (*Cirsium vinaceum*)

Status of Species (Range-wide)

Sacramento Mountains thistle was listed as threatened without critical habitat on June 16, 1987. This plant is a stout biennial 1.0-1.8 m tall. It is found around travertine springs, in wet meadows, and along stream banks in the mixed conifer zone of the Sacramento Mountains at 7,500-9,500 ft elevation. There are about 62 sites for this species occupying about 77 acres. Plants often grow in dense populations with estimates of total plant numbers being as high as 49,000.

Status of the Species (In the Action Area)

Sacramento Mountains thistle occurs on the Lincoln NF, Mescalero Apache Reservation, and private land. Of the 62 occupied sites, 58 occur on the Lincoln NF. Cattle have been found to make significant forage use of Sacramento Mountains thistle, especially in certain locations and during certain periods. Pastures without cattle show little grazing, suggesting that elk and deer have no significant effect on the plant. About 62 percent of the plants are located in areas excluded from livestock through fencing or inaccessible terrain. Teasel and musk thistle are two noxious weeds that can occupy Sacramento Mountains thistle habitat. These two weeds infest approximately 2,000 acres on the Sacramento Ranger District. About 40 percent of the Sacramento Mountains thistle sites have noxious weeds present. Diversion of water from Sacramento Mountains thistle habitat is a long-range concern. Presently, water is legally diverted from two occupied springs, but both retain some flow for the plants. Roads and trails affect spring flow patterns and promote recreation disturbance in some areas, but these impacts are presently relatively minor.

Effects of the Action

Forest Service activities that may affect Sacramento Mountains thistle include grazing, water management, recreation, timber management, and noxious weed control.

About 62 percent of the plants are in areas excluded from grazing, mostly through fenced exclosures. Livestock impacts are closely monitored at grazed sites, and cattle are removed from the pasture, herded from the area, or protective fencing is constructed when 25 percent or more of the Sacramento Mountains thistle plants exhibit 40 percent or more herbivory. During the summer of 1996, when drought conditions occurred, some populations were protected with temporary fencing. Water rights, watershed programs, road management, and timber programs all affect water management on the Forest. A concern with these programs is the need for continued spring flows to maintain Sacramento Mountains thistle habitat. Timber harvest can potentially affect the species by impacting watershed conditions and causing sedimentation and erosion if appropriate precautions are not taken. Noxious weeds have increased dramatically in recent years. The Forest is initiating a weed control program.

The Lincoln NF LRMP includes a number of protective provisions for endangered species. These provisions, designed to reduce impacts of Forest activities on the species, include requirements such as prohibiting herbicide spraying in the area, planning for the species' requirements in grazing management, and prohibiting disturbing activities (including public use) as necessary. The LRMP also directs that the Lincoln NF should be managed in accordance with Recovery Plans for endangered species. The Sacramento Mountain Thistle Recovery Plan was approved in 1993, and it includes numerous protective recommendations. Further, the 1996 Record of Decision for Amendment of Forest Plans that adopted standards and guidelines for managing the Mexican spotted owl includes a provision that activities necessary to implement the Sacramento Mountain Thistle Recovery Plan will take precedence over any conflicting Mexican spotted owl standards and guidelines. The sum of these protections should preclude project designs and actions that may cause a reduced likelihood of survival and recovery of the species.

Cumulative Effects

A few localities occur on the Mescalero Apache Reservation and private lands, where impacts are unknown. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction provided by the Lincoln NF LRMP.

Conclusion

After reviewing the current status of the Sacramento Mountains thistle, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is

not likely to jeopardize the continued existence of the Sacramento Mountains thistle. The population appears stable, and the Forest Service has taken steps to protect the species from grazing and introduced weeds and to implement the Recovery Plan. Further, management direction in new amendments to the LRMP's give precedence to implementation of the thistle recovery plan over any conflicting Mexican spotted owl standards and guidelines.

SACRAMENTO PRICKLY POPPY (*Argemone pleiacantha* ssp. *pinnatisecta*)

Status of Species (Range-wide)

Sacramento prickly poppy was listed as endangered without critical habitat on August 24, 1985. It is a herbaceous perennial plant found in rocky canyon bottoms and slopes, and occasionally along roadsides at 5,000 to 7,000 ft elevation on the west slope of the Sacramento Mountains in south-central New Mexico. Plants are most commonly found on natural and human-disturbed sites with a significant water supply, including dry stream beds, pipeline rights-of-way, and roadsides. Soils are typically loose and gravelly. There are more than 1,000 plants known.

Status of the Species (In the Action Area)

Sacramento prickly poppy occurs on Lincoln NF, BLM, state, and private land. It also occupies county and state road right-of-way and City of Alamogordo water pipeline right-of-way. Most of the plants are on the Lincoln NF. Sacramento prickly poppy is adapted to disturbed areas, but the degree or type of disturbance that most benefits the plant is poorly understood. It does not appear to increase with severe disturbance as do other prickly poppies. Low plant numbers make the viability of populations a concern, and any activity that destroys adult seed-producing plants threatens population viability. The most conspicuous activities that may destroy plants are road and water pipeline maintenance. Decreased spring flow caused by capture of springs for City of Alamogordo municipal water may have reduced available water for Sacramento prickly poppies.

Effects of the Action

Forest Service activities that may affect Sacramento prickly poppy include grazing, recreation, and facilities and transportation construction.

All canyons on the west side of the Sacramento Mountains occupied by the prickly poppy are permitted for grazing. Cattle will graze prickly poppies but mostly when other forage is limited. Adult prickly poppies that are grazed produce multiple leaders that may lead to increased flowering in grazed plants. The effect of grazing on young plants is difficult to study because seedling plants are rarely observed. Maintenance and use of recreation trails is expected to have little impact on Sacramento prickly poppy because of the small area impacted

and the infrequency of plants. The Forest Service issues permits for water pipeline work and highway maintenance. Activities allowed under the permits undergo section 7 evaluation prior to permit issuance. Overall, riparian restoration goals and management that balances livestock use with site capacities should benefit the subspecies.

The Lincoln NF LRMP includes a number of protective provisions for endangered species. These provisions, designed to reduce impacts of Forest activities on the species, include requirements such as prohibiting herbicide spraying in the area, planning for the species' requirements in grazing management, and prohibiting disturbing activities (including public use) as necessary. The LRMP also directs that the Lincoln NF should be managed in accordance with recovery plans for endangered species. The Sacramento Mountain Prickly Poppy Recovery Plan was approved in 1994, and it includes numerous protective recommendations. The sum of these protections should preclude project designs and actions that may cause a reduced likelihood of survival and recovery of the species.

Cumulative Effects

Although it occurs mostly on the Lincoln NF, the Sacramento prickly poppy also occurs on private and state lands, state and county road rights-of-way, and City of Alamagordo water pipeline rights-of-way. Flagging of plants has avoided most impact from road and pipeline maintenance. Any private and state activities in the national forest area that would require a Forest Service permit would require review by the Forest Service under the direction provided by the Lincoln NF LRMP.

Conclusion

After reviewing the current status of the Sacramento prickly poppy, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the Sacramento prickly poppy. Management direction in the existing Lincoln NF LRMP, including direction to manage the species in accordance with the recovery plan should avoid serious impacts to the species.

SAN FRANCISCO PEAKS GROUNDSEL (*Senecio franciscanus*)

Status of the Species (Range-wide)

San Francisco Peaks groundsel is listed as threatened without critical habitat. It is a small plant found only in the alpine tundra habitat of the San Francisco Peaks. This groundsel grows on steep, moderately stable cinder/talus slopes as a primary successional species and is usually the dominant plant found in that community. Reproduction is mainly vegetative by rhizomes, but sexual reproduction does occur. Flowering is in July to early September, and the fruits

begin to mature in mid-September. The plants are in winter dormancy by early October. Mature plant colonies are found near rocks where they are better sheltered from harsh elements. Soil moisture is the most important factor controlling distribution and growth.

Status of the Species (In the Action Area)

The groundsel occurs in the Kachina Peaks Wilderness Area of the Coconino NF, with populations on Humphreys, Agassiz, Fremont, and Doyle Peaks. It occurs above 3,440 m and along the north rim that extends northeast from Humphreys Peak. Plants are common on every major peak in the San Francisco Mountains above 3,476 m. Population numbers fluctuate in response to moisture availability and other ecological factors. In October of 1991, the Forest Service reported evidence of impacts from livestock. Damage occurred to the population from hoof action or trampling of the plants on the loose talus slope. Damage also occurred where talus materials were pushed down the slope, exposing the groundsel stems.

Effects of the Action

The primary potential threats to the groundsel are recreation and grazing; that is, the trampling and habitat destruction caused by hikers and by livestock.

The Forest Service has closed hiking trails in the areas most impacted. Specific direction for managing and protecting the groundsel from threatening activities is found in the San Francisco Peaks Alpine Tundra Management Plan, which has been incorporated into the Coconino NF LRMP. This direction includes protection of 325 acres of alpine areas to improve habitat for the groundsel by closing the area during snow-free periods, limiting access to designated trails, and closure of the area to livestock grazing. In addition, the LRMP directs that the groundsel's recovery plan be implemented. The sum of these protections should preclude project designs and actions that may cause a reduced likelihood of survival and recovery of the species.

Cumulative Effects

The known occurrences of this species are all on Forest Service lands. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction of the Coconino NF LRMP.

Conclusion

After reviewing the current status of the San Francisco Peaks groundsel, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the Coconino NF LRMP is not likely to jeopardize the continued existence of the San Francisco Peaks

groundsel. Specific, protective direction for the management of the groundsel within the LRMP should promote the survival of the species.

TODSEN'S PENNYROYAL (*Hedeoma todsenii*)

Status of Species (Range-wide)

Todsen's pennyroyal was listed as endangered on January 19, 1981. Critical habitat is designated for populations on White Sands Missile Range only. This plant is a perennial herb 10-20 cm tall. It has low seed production and most reproduction within populations appears to be asexual from rhizomes. This species is found on north and east facing steep slopes in gravelly gypseous limestone soil in piñon/juniper and sometimes ponderosa pine vegetation. It occurs on the western slope of the Sacramento Mountains between Alamogordo and Tularosa, and in the San Andres Mountains. There are three sites in the San Andres Mountains and 16 sites in the Sacramento Mountains. Sites contain thousands of plant stems, but the actual number of plants is unknown owing to the extensive rhizome connections between plants.

Status of the Species (In the Action Area)

Todsen's pennyroyal occurs on Department of Defense, BLM, and Lincoln NF lands. The most extensive populations occur in the Sacramento Mountains. These populations are about evenly split between BLM and Forest Service management. The relatively remote and inaccessible locations of Todsen's pennyroyal afford the species some protection. Yet, because of the fragile nature of the habitat and the small size of some populations, accidental disturbance or changes in land use could destroy populations. The low rate of sexual reproduction raises concern for the genetic viability of the species.

Effects of the Action

Forest Service program areas that could affect Todsen's pennyroyal include timber, fire, range, and recreation.

Todsen's pennyroyal occurs mostly within piñon/juniper woodlands. On the Lincoln NF, all occupied habitat falls within areas identified as unsuitable and inappropriate for timber or fuelwood production. The occupied habitat is within two grazing allotments. One allotment was administratively closed for watershed management purposes in 1978. The other allotment was waived back to the Forest Service in 1987 and has since remained closed. One motorized trail and one foot trail occur within the vicinity of occupied habitat, but recreational use is light and impacts should be negligible. The effect of fire on Todsen's pennyroyal is unknown, but survival from fires of moderate intensity should be high owing to plant reproduction from rhizomes. Fire management guidelines for areas of occupied habitat are compatible with the species' survival. The Lincoln NF LRMP includes a number of protective provisions for

endangered species. These provisions, designed to reduce impacts of Forest activities on the species, include requirements such as prohibiting herbicide spraying in the area, planning for the species' requirements in grazing management, and prohibiting disturbing activities (including public use) as necessary. In addition, the Lincoln NF LRMP directs that endangered and threatened species be managed according to approved recovery plans. The Todsen's pennyroyal Recovery Plan was approved on 1985. The sum of these protections should preclude project designs and actions that may cause a reduced likelihood of survival and recovery of the species.

Cumulative Effects

The known occurrences of this species are all on Federal lands. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service.

Conclusion

After reviewing the current status of Todsen's pennyroyal, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of Todsen's pennyroyal. Critical habitat for this species has been designated on White Sands Missile Range; however, this action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated. The population trend for this species is stable, and the inaccessibility of much of its habitat make it unlikely that direction provided by the current Lincoln NF LRMP would be likely to compromise the survival of the species. The LRMP's general protections for endangered and threatened species, in particular the direction to manage according to approved recovery plans, should promote the survival of the species.

ANIMALS - FISHES

APACHE TROUT (*Oncorhynchus apache*)

Status of the Species (Range-wide)

The Apache trout, sometimes called the Arizona trout, is listed as threatened without critical habitat. It historically inhabited about 965 km of streams in waters of the upper Salt River (Black and White Rivers) and headwaters of Little Colorado River. Remaining natural occurrences of the species are primarily in small montane streams and cienegas in headwaters of the Black and White river drainage in Arizona. Historically, all suitable perennial streams above 1,800 m and draining the White Mountains were probably occupied. The substrates of these cold, high-gradient streams consist mainly of boulders, rocks and gravel with some sand

and silt. These streams flow through mixed coniferous forests with spruce, fir, and aspen dominating at higher elevations, grading to Ponderosa pine forest at lower elevations. Oxygen concentrations of these streams are typically at saturation, pH is near neutral, and levels of alkalinity, dissolved solids, suspended solids and turbidity are low. Spawning occurs in the spring. Eggs are

deposited in redds, and fry emerge in about 60 days. Fry appear to feed on plankton; larger fish feed on a variety of other fish, crustaceans, mollusks, and insects.

Status of the Species (In the Action Area)

Native populations of Apache trout occupy waters on the Apache-Sitgreaves NF and Fort Apache Indian Reservation. Populations have been introduced outside the species' historic range into waters of the Apache-Sitgreaves, Coronado, and Kaibab NF's. On the Coronado NF, Grant Creek is the only location considered to hold pure (nonhybrid) Apache trout. On the Kaibab NF, only the North Canyon Creek population is considered pure.

Several streams on the Apache-Sitgreaves NF are thought to contain pure Apache trout, and several other streams contain populations with some contamination from hybridizing with introduced trout. The Apache Trout Recovery Plan lists 14 naturally occurring populations believed to remain pure in the White Mountains of Arizona. An additional 17 streams have received introduced populations since 1963. Williams Creek National Fish Hatchery has cultured Apache trout since 1981. Approximately 50 percent of the hatchery's production is Apache trout. These are stocked into streams and impoundments within the White Mountains. Because of the refugium/brood stocks at Williams Creek and stream renovations and reintroduction, the status of the species continues to improve. However, habitat deterioration, and genetic contamination, through hybridization, from nonnative trout threaten the security of individual populations and some strains.

Livestock grazing has contributed to degradation of stream habitat of the Apache trout. The Forest Service has excluded livestock from at least ten streams occupied by the species.

Effects of the Action

Forest programs that continue to affect the Apache trout include range management, soil and water management, fire management, and stocking of nonnative trout.

All Apache trout streams are recognized in the LRMP for the Apache-Sitgreaves NF as Priority 1 riparian systems. According to the biological assessment, this designation gives direction to "improve the aquatic and vegetative components of this system through revised livestock grazing plans, fencing, and other special management prescriptions." The biological assessment indicates that direction in the LRMP to manage Apache trout habitat for at least 60 percent of its capacity is tempered by other, more general direction so that, "full compliance

with management direction in the Forest Plan precludes the implementation of management activities that reduce riparian and stream habitat capabilities for Apache trout below their potential . . . ."

The LRMP's provide for cooperation with the AGFD on fish stocking. Stocking of nonnative rainbow trout continues to be barrier to the expansion and recovery of the Apache trout. The biological assessment indicates that the Forest Service is working with AGFD on a revised strategic plan that will provide further protection of Apache trout from stocking of nonnative fish.

LRMP direction for soil and water management should promote the improvement of habitat quality. Prescribed burns are provided for in direction for fire management. Prescribed burns should reduce the risk of catastrophic fire, which is a major threat to Apache trout.

The Coronado NF LRMP has general protections for endangered species and specifically provides for maintaining or improving current levels of occupied habitat for the Apache trout (p. 68). No Forest programs are likely to adversely affect the only pure Coronado NF population, in Grant Creek. The Kaibab NF population is protected from grazing and other conflicts, and specific provisions of the Kaibab NF LRMP protect its habitat (p. 176), but is potentially subject to extirpation if a major fire were to occur in the drainage. No Forest programs are likely to adversely affect the sole population there, in North Canyon Creek.

New direction to enhance habitat conditions for the Little Colorado spinedace should improve habitat quality for Apache trout in areas where both species occur.

Compliance with these LRMP's, together with general direction to implement the Apache Trout Recovery Plan, will improve conditions for the Apache trout and should preclude project designs or actions that would cause a reduced likelihood of survival and recovery.

Cumulative Effects

Any private, tribal, and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction of the LRMP's.

Conclusion

After reviewing the current status of the Apache trout, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the Apache trout. The population is currently stable, which is at least partly attributable to Forest Service participation in the cooperative recovery effort for this species.

Incidental Take Statement for Apache Trout

Amount or Extent of Incidental Take

Activities carried out under the LRMP's that could result in incidental take include fencing riparian areas and other management actions to enhance Apache trout habitat, population monitoring, and traffic from livestock and motor vehicles at stream crossings. The Service anticipates, however, that incidental take of the Apache trout associated with implementation of the LRMP's will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in numbers. Populations may expand and contract in response to the amount of surface water available, which is in turn dependent on seasonal and yearly variation in rainfall.

The Service is therefore defining the anticipated level of take in terms of the condition of the Apache trout's habitat. The anticipated level of incidental take in terms of this surrogate measure is expressed as maintenance of at least the current level of habitat quality. Any decline in habitat quality, as measured by selected habitat parameters, would exceed this level of incidental take.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take:

1. Carry out activities in or near Apache trout habitat in a manner that will minimize impacts on individual Apache trout.

2. Develop and implement a habitat monitoring protocol that is capable of detecting when the anticipated level of incidental take is approached or exceeded.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1 The following terms and conditions implement reasonable and prudent measure number 1:

a. To the maximum extent practicable, the Forest Service will design and time activities that affect the species and its habitat to minimize impacts on individual Apache trout. Timing should take into account the vulnerability of Apache trout to the activity and the urgency of the activity for improving conditions for the species.

b. All reasonable efforts will be made to exclude livestock from habitat occupied by the Apache trout.

2. The following terms and conditions implement reasonable and prudent measure number 2:

a. The Forest Service will develop and implement an annual, standardized monitoring protocol that is based on selected habitat parameters, and that is capable of detecting a decline in habitat quality for the purposes of determining when the anticipated level of incidental take is approached or exceeded.

b. The Forest Service will transmit annual monitoring reports to the Arizona Ecological Services Office by December 31 of each year. The reports will briefly document for the current calendar year the collected data on the selected habitat parameters and make recommendations for revising these terms and conditions to make them more protective of the species, more reflective of habitat conditions, and less restrictive on Forest activities.

Conservation Recommendations

1. The direction in the Apache-Sitgreaves NF LRMP to manage habitat for at least 60 percent of capacity for the Apache trout should be deleted, explained, or qualified when the LRMP is next amended.

2. In the interim, guidance should be issued to clarify that other management direction to recover Apache trout indicates that management activities are to be implemented to achieve full potential stream habitat capabilities for the Apache trout, as indicated in the Apache-Sitgreaves NF LRMP biological assessment.

CHIHUAHUA CHUB (*Gila nigrescens*)

Status of the Species (Range-wide)

The Chihuahua chub is listed as threatened without critical habitat. It is endemic to the Guzman basin, where it occurs only in the Mimbres River in New Mexico. It historically occurred in the Rio Casas Grandes, Rio Piedras Verdes, Arroyo del Aguila, Rio San Miguel, Rio Santa Marina, Rio del Carmen, and Rio Janos and within the Laguna Bustillos Basin in the State of Chihuahua, Mexico. The Mimbres River is the northern part of the species' range.

In the U.S., the Chihuahua chub occurs in about 3 stream mi of the Mimbres River between Allie Canyon and a point opposite the town of Mimbres and in part of the Gila NF. The Mimbres River portion of the wild population receives protection now that its habitat has been acquired by The Nature Conservancy and the State of New Mexico Department of Game and Fish. Its status in Mexico is unknown but believed to have declined significantly.

The species relies heavily on deep pools with undercut banks or over-hanging vegetation for cover. Pools and in-stream cover appear to be requirements for the species to complete its life cycle. Additional data on habitat requirements and life history are sparse. Watershed management that favors historic stream conditions that provide good pool/run/riffle ratios is believed to be necessary for the species to survive in the wild.

The chub tends to be trout-like in feeding behavior, taking terrestrial insects on the surface as well as aquatic invertebrates and perhaps some fish and vegetation. In the Mimbres River, spawning begins in late April and May, but may extend into the summer; the spawning period may even be bimodal. Little information exists on parental care provided by this species. It has been suggested that spawning takes place in quiet pools over matted beds of aquatic vegetation. A refugium/brood stock population is maintained at Dexter National Fish Hatchery and Technology Center where the species spawns naturally in ponds.

Primary potential threats to the species include severe stream modification by agricultural, flood control, and other activities, both in its habitat areas and upstream, and introduction of nonnative fish.

Status of the Species (In the Action Area)

About 450 hatchery-bred individuals were stocked into McKnight Creek on the Gila NF in 1992. Several other streams on the Gila NF are considered suitable reintroduction sites.

Effects of the Action

Forest programs such as range management, soil and water management, roads and trails construction, and recreation that impact the stream and associated flood plain could affect the Chihuahua chub. Several features of the LRMP for the Gila NF, if followed, would eliminate or minimize effects from activities in these program areas. Potential and occupied habitats are within management areas where LRMP emphasis is on long-term increase in herbaceous forage for wildlife. The spotted owl and goshawk standards and guidelines could improve riparian conditions. The biological assessment indicates that permitted uses along McKnight Creek are light and appear to have little effect on the aquatic habitat or stream channel.

Wildlife standard and guidelines for the management area including McKnight Creek indicate that management plans for endangered and threatened species will be addressed as recovery plans are completed and approved. General Wildlife standards and guidelines direct that

recovery projects included in approved recovery plans be accomplished. The Chihuahua Chub Recovery Plan was approved in 1986. Chubs were subsequently stocked in McKnight Creek in 1992.

The LRMP's emphasis on game fish in the Mimbres River reduces its potential for use as a recovery stream, especially in view of the increased threat of introduction of nonnative fish. Grazing utilization levels may not achieve improvements to provide for recovery in streams other than McKnight Creek.

Cumulative Effects

The area that includes the major portion of the wild population receives protection now that it has been acquired by The Nature Conservancy and the State of New Mexico. Any private and state activities affecting the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction of the Gila NF LRMP.

Conclusion

After reviewing the current status of the Chihuahua chub, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the Chihuahua chub. Although conflicts with grazing and recreational fishing may constrain maximum recovery efforts on the Forest, chubs have been reintroduced onto the Forest following direction in the LRMP's.

Incidental Take Statement for Chihuahua Chub

Amount or Extent of Incidental Take

Activities carried out under the LRMP's that could result in incidental take include protective fencing of riparian areas and other management actions to enhance Chihuahua chub habitat, and population monitoring. The Service anticipates, however, that incidental take of the Chihuahua chub associated with implementation of the LRMP's will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in numbers. Populations may expand and contract in response to the amount of surface water available, which is in turn dependent on seasonal and yearly variation in rainfall.

The Service is therefore defining the anticipated level of take in terms of the condition of the Chihuahua chub's habitat. The anticipated level of incidental take in terms of this surrogate measure is expressed as maintenance of at least the current level of habitat quality. Any decline in habitat quality, as measured by selected habitat parameters, would exceed this level of incidental take.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take:

1. Carry out activities in or near Chihuahua chub habitat in a manner that will minimize impacts on individual Chihuahua chubs.

2. Develop and implement a habitat monitoring protocol that is capable of detecting when the anticipated level of incidental take is approached or exceeded.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following terms and conditions implement reasonable and prudent measure number 1:

    a. To the maximum extent practicable, the Forest Service will design and time activities that affect the species and its habitat to minimize impacts on individual Chihuahua chubs. Timing should take into account the vulnerability of Chihuahua chub to the activity and the urgency of the activity for improving conditions for the species.

    b. All reasonable efforts will be made to exclude livestock from habitat occupied by the Chihuahua chub.

2. The following terms and conditions implement reasonable and prudent measure number 2:

    a. The Forest Service will develop and implement an annual, standardized monitoring protocol that is based on selected habitat parameters, and that is capable of detecting a decline in habitat quality for the purposes of determining when the anticipated level of incidental take is approached or exceeded.

    b. The Forest Service will transmit annual monitoring reports to the Albuquerque Ecological Services Office by December 31 of each year. The reports will briefly document for the current calendar year the collected data on the selected habitat

parameters and make recommendations for revising these terms and conditions to make them more protective of the species, more reflective of habitat conditions, and less restrictive on Forest activities.

Conservation Recommendation

Develop a standard or guideline that requires maintenance of stable streambanks within potential recovery areas for the Chihuahua chub, to be incorporated into the LRMP for the Gila NF when it is next amended.

DESERT PUPFISH (*Cyprinodon macularius*)

Status of the Species (Range-wide)

The desert pupfish is listed as endangered, with critical habitat designated at: Quitobaquito Spring, Pima County, Arizona; San Felipe Creek, Carrizo Wash and Fish Creek Wash, Imperial County, California.

Historically, this species occupied waters of the Gila River basin below 1,500 m in Arizona and Sonora Mexico; the lower Colorado River in Arizona and California downstream of Needles to the Gulf of California and on to its delta in Sonora and Baja California; the Rio Sonoyta of Arizona and Sonora; Puerto Penasco, Sonora; and the endorheic Laguna Salada basin of Baja, California. Natural populations of the Colorado River subspecies persist in at least a dozen locales in the U.S. and Mexico. Additionally, some 24 populations of transplanted populations exist in the U.S.

Desert pupfish occupied a diversity of habitats ranging from cienegas and springs to small streams and margins of larger bodies of water. Most habitats were shallow and had soft substrates and clear waters. Pupfish have an extraordinary ability to survive under conditions of high water temperatures (to 45°C), low dissolved oxygen concentrations (< than .5 mg/L) and high salinity (68 g/L). Young fish usually become sexually mature by the time they are 1 year old. In the wild, longevity is 3 years or less. Larval fish are believed to consume small invertebrates and various forms of plankton. As they grow, wild fish become opportunistic omnivores, consuming whatever is available, including algae, plants, suitably-sized invertebrates, and detritus. Adults feed on ostracods, copepods and other crustaceans, insects, pile worms, mollusks, and bits of aquatic macrophytes.

The Recovery Plan for this species recognizes at least twelve locales in the U.S. and Mexico where this species still occurs in the wild. In addition some 25 extant populations have been transplanted in the wild.

Status of the Species (In the Action Area)

The desert pupfish probably does not now occur on any of the NF's and no designated critical habitat exists on the NF's. Potential reintroduction sites are on the Coronado NF. A reintroduced population at one of these sites, Bog Hole, is probably now extirpated. Bog Hole remains a potential reintroduction site. It is managed through protective cooperative agreements with the AGFD. This and other sites on the Coronado NF will require removal of nonnative predators and improved watershed management for better water quality for successful re-establishment and recovery on the NF's. The biological assessment on the Coronado NF LRMP indicates that the Plan is "Likely to Adversely Affect" the desert pupfish, based on the lack of direction in the plan specifically addressing the special management needs of Bog Hole, in combination with Forest management activities affecting potential recovery habitats in the area.

Effects of the Action

Program areas of concern are range management, soil and water management, recreation, and off-road vehicle management.

LRMP direction for soil and water management should generally improve watershed and riparian conditions for desert pupfish habitat. Range management can also affect riparian conditions. Drainages associated with Bog Hole have been protectively fenced, but other possible reintroduction sites may be subject to adverse affects. Recreational impacts to Bog Hole are limited by closure to vehicular access.

The Coronado NF LRMP includes general protective provisions for riparian areas and endangered and threatened species, but it also provides for activities that could adversely affect potential reintroduction sites for the desert pupfish. However, the lack of these potential recovery sites on the Coronado NF neither appreciably reduces the likelihood of recovery or survival of the desert pupfish, when the range-wide status of the species is considered, nor destroys or adversely modifies its critical habitat. Protective management direction for the Bog Hole reintroduction site has been agreed to with AGFD. The biological asssessment indicates that full application of the LRMP's management area direction for wildlife and fish could result in additional efforts to reintroduce the desert pupfish.

Cumulative Effects

Any private and state activities affecting the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction of the Coronado NF LRMP.

Conclusion

After reviewing the current status of the desert pupfish, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of desert pupfish. Critical habitat has not been designated on any national forest; therefore, this action does not affect the critical habitat of the desert pupfish. The range-wide status of the desert pupfish is stable. This species is not known to currently occur on Forest Service lands. Reintroduction of the species on Forest Service lands could make a limited contribution to recovery of the species, but current activities under the direction of the LRMP's do not compromise the survival of the species.

Incidental Take Statement for Desert Pupfish

The Service does not anticipate that the proposed action will incidentally take any desert pupfish.

Conservation Recommendation

Develop and implement a plan to reintroduce the desert pupfish into suitable historic habitat on the Coronado NF, including additional protective management directions for potential reintroduction sites. The management plan for Bog Hole with the AGFD should be incorporated into the Coronado NF LRMP.

GILA TOPMINNOW (*Poeciliopsis occidentalis*)

Status of the Species (Range-wide)

The Gila topminnow is listed as endangered without critical habitat. Historically widespread and abundant in the Gila River drainage, this species now occupies a small remnant of its former range. It is known to occur naturally in only eight isolated locations in the U.S. These natural populations occur primarily in the Santa Cruz River system, a tributary of the Gila River. Reintroduction has occurred at several sites; however long-term survival often has not occurred at these sites. Several populations are on private and Tribal lands.

It prefers shallow, warm, fairly quiet water, but can adjust to a rather wide range, living in moderate currents, depths up to 1.0 m and temperature regimes from constant 26-28°C to stream conditions fluctuating from 6-37°C. Foods are generalized and include bottom debris, vegetative materials, amphipod crustaceans, and insect larvae. The life span of this species is approximately 1 year, but appears to be linked to sexual maturation, which in turn is dependent upon the time of year in which individual fish were born. This fish is a live bearer. Onset of breeding and brood size are affected by water temperature, photoperiod, food availability, and

predation. Western mosquitofish, an aggressive, nonnative, competitor/predator, are the greatest threat to the Gila topminnow.

Status of the Species (In the Action Area)

Redrock Canyon in the Sonoita Creek drainage near Patagonia. Arizona is the only natural occurring population on Forest Service lands and the only population (natural or reintroduced) occurring on the Coronado NF. Water in Redrock Canyon is perennial-interrupted. and populations of fish persist in only a few locations along its length where surface water is perennial. As with most topminnow populations, the Redrock Canyon population varies seasonally and through time, reflecting habitat conditions. Given these naturally occurring fluctuations, this topminnow population is relatively stable. Nonnative western mosquitofish are found throughout the drainage. The topminnow persists at seven reintroduction sites on the Tonto NF, where additional potential sites have been identified.

Effects of the Action

Activities that influence quantity or quality of water affect the topminnow. Such activities that could affect topminnow and their habitat include timber management, grazing, off-road vehicle use, road construction and maintenance, and fire management. The Coronado NF's biological assessment indicates that direction provided by standards and guidelines on endangered and threatened species, riparian, and range management should, if adequately implemented, provide sufficient protection from the above activities. Much of the habitat occupied by the Gila topminnow has been protected from grazing via the Redrock Canyon Action Plan.

The Coronado, and to a lesser extent the Tonto, NF LRMP's call for taking recovery actions (including reintroduction) of endangered species in accordance with species recovery plans; the Gila Topminnow Recovery Plan was approved in 1984, prior to these LRMP's. The chief threat to the species appears to be the introduction of nonnative western mosquitofish, rather than threats posed by activities authorized under the LRMP's. The Coronado and Tonto NF LRMP's are not providing for and promoting projects and actions that appreciably reduce the likelihood of survival and recovery of the Gila topminnow or that destroy or adversely modify critical habitat.

Cumulative Effects

Any private and state activities affecting the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction of the Coronado and Tonto NF LRMP's.

Conclusion

After reviewing the current status of the Gila topminnow, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of Gila topminnow. The Coronado and Tonto NF LRMP's support the implementation of the Gila Topminnow Recovery Plan and include standards and guidelines to protect the species. Further, seven reintroduced populations on the Tonto NF represent the Forest Service's positive contribution to the recovery of the species.

Incidental Take Statement for Gila Topminnow

Amount or Extent of Incidental Take

Activities carried out under the LRMP's that could result in incidental take include recreational activities, livestock use of riparian areas, fencing riparian areas and other management actions to enhance Gila topminnow habitat, and population monitoring. The Service anticipates, however, that incidental take of the Gila topminnow associated with implementation of the LRMP's will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in numbers. Populations may expand and contract in response to the amount of surface water available, which is in turn dependent on seasonal and yearly variation in rainfall.

The Service is therefore defining the anticipated level of take in terms of the condition of the Gila topminnow's habitat. The anticipated level of incidental take in terms of this surrogate measure is expressed as maintenance of at least the current level of habitat quality. Any decline in habitat quality, as measured by selected habitat parameters, would exceed this level of incidental take.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take:

1. Carry out activities in or near Gila topminnow habitat in a manner that will minimize impacts on individual Gila topminnows.

2. Develop and implement habitat monitoring to detect when the anticipated level of incidental take is approached or exceeded.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following term and condition implements reasonable and prudent measure number 1:

    a. To the maximum extent practicable, the Forest Service will design and time activities that affect the species and its habitat to minimize impacts on individual Gila topminnows. Timing should take into account the vulnerability of Gila topminnows to the activity and the urgency of the activity for improving conditions for the species.

    b. All reasonable efforts will be made to exclude livestock from the riparian corridor of streams occupied by the Gila topminnow.

2. The following terms and conditions implement reasonable and prudent measure number 2:

    a. The Forest Service will develop and implement an annual, standardized monitoring protocol that is based on selected habitat parameters, and that is capable of detecting a decline in habitat quality for the purposes of determining when the anticipated level of incidental take is approached or exceeded.

    b. The Forest Service will transmit annual monitoring reports to the Arizona Ecological Services Field Office by December 31 of each year. The reports will briefly document for the current calendar year the collected data on the selected habitat parameters and make recommendations for revising these terms and conditions to make them more protective of the species, more reflective of habitat conditions, and less restrictive on Forest activities.

Conservation Recommendations

1. Develop and implement a plan to reintroduce the Gila topminnow into suitable historic habitats in the NF's, consistent with recovery plan measures for the species.
2. Fully implement the existing protective measures for the Gila topminnow in the LRMP's.
3. Explicitly incorporate other protective plans, such as the "Redrock Canyon Action Plan" into the appropriate LRMP's.

GILA TROUT (*Oncorhynchus gilae*)

Status of the Species (Range-wide)

The Gila trout is listed as endangered without critical habitat. Gila trout was the only native trout in the headwaters of the Gila River drainage in New Mexico; it is found primarily in high elevation streams. Unique characteristics of Gila trout in Spruce Creek suggest it is also native to the San Francisco drainage in New Mexico. The species reportedly once occurred in the Verde and Agua Fria drainages in Arizona. By 1950, the range of the species had been severely fragmented and restricted to small isolated headwater streams. When the species was listed in 1973, only five relictual populations remained. These were the Main Diamond, South Diamond, McKenna, Spruce, and Iron Creek populations. Since listing, several populations have been translocated or reintroduced to other locations within the species' historic range.

Gila trout spawn in the spring (from early April through June, depending on the elevation). Spawning redds are constructed and spawning is initiated when water temperatures warm to 8°C. Female fish usually become sexually mature at 3 to 4 years of age; males may become sexually mature at an earlier age. Ripe females are believed to deposit up to 200 eggs per season. Fry emerge from 56-70 days following egg deposition. Growth rates vary, but Gila trout generally reach 180-220 mm by the end of the third growing season. Gila trout feed on a variety of insects. Habitat loss, sedimentation, riparian degradation, hybridization with introduced trout and competition/predation have been identified as major factors causing Gila trout decline throughout their historic range.

Status of the Species (In the Action Area)

Five relict and eight re-established populations of Gila trout occur in the Gila, San Francisco and Mimbres river drainages. These populations are mostly within the Gila NF. Because of a variety of environmental factors and competition/predation from nonnative trout, these populations vary in number and size. The Forest Service is an active participant in the recovery efforts for Gila trout. Cooperative efforts among the Forest Service, New Mexico Game and Fish Department, the Fish and Wildlife Service, various state and county agencies and private individuals provide an active management program.

Gila trout was historically the only native trout in the headwaters of the Gila and San Francisco river drainages of New Mexico. The species reportedly once occurred in the Verde and Agua Fria drainages in Arizona as well. The decline in abundance of Gila trout has been linked to competition and predation by and hybridization with nonnative salmonids, and changes in habitat conditions. The current range of the species has been severely constricted and fragmented into small, isolated headwater streams within the Gila NF of southwestern New Mexico. At the time of listing of the Gila trout in 1966, the species was known to exist in only five small streams (Main Diamond, South Diamond, McKenna, Spruce, and Iron creeks), and only in portions of those streams. The major priority in the recovery of the species has been to

secure those known populations and then replicate them at selected streams, thereby expanding the chances of survival of Gila trout from stochastic events that might decimate any one isolated population. These replication efforts, translocating specific strains identified by the original host stream, were aimed at preserving the genetic diversity of the species by ensuring that each lineage received its replicate.

Recovery efforts had resulted in the replication of each of the five relictual populations by 1987. Criteria for downlisting were thought to have been met in that year. As a result of attainment of those criteria and the security thought to have been established for the original and replicate populations, the Service formulated a proposal to formally reclassify the Gila trout as threatened. However, the due to new information (the discovery of the continued presence of brown trout, a predator on the Gila trout, in one of the recovery streams; and the effects of drought, fire, and floods upon the populations in three major recovery streams), the proposal was withdrawn in 1991. The status of many of the populations has been drastically changed by both natural and human caused events in the past 5 years, deteriorating from secure to tenuous at best to extirpated.

The remnant Main Diamond population was eliminated by the Divide Wildfire in July 1989. The fire burned much of the watershed of upper Main and South Diamond creeks. During the fire, 566 Gila trout were evacuated from Main Diamond Creek to Mescalero National Fish Hatchery. After the fire, rainstorms washed ash and charcoal into stream and frequent flooding mobilized unstable slope materials and incised portion of the upper reaches of the stream to bedrock. The watershed was not deemed suitable for reestablishment of Gila trout until 1993. Since then, Main Diamond Creek has received three stockings of approximately 150 fish each. These fish were produced at Mescalero National Fish Hatchery from fish evacuated from Main Diamond Creek during the 1989 wildfire. An assessment of this population will be made during the 1997 field season to determine if reestablishment has been successful. Main Diamond was replicated in McKnight, Sheep Corral, and Gap creeks (the latter stream in Arizona). Flooding in August 1988 caused major reductions in pool habitat and over 90 percent loss of Gila trout in McKnight Creek (Turner 1989). In October 1989, 200 of the evacuated Gila trout from Main Diamond Creek were stocked into McKnight Creek. Despite several natural events reducing its abundance, the McKnight Creek population has maintained itself to date. Sheep Corral Creek provides at best marginal habitat for the species, and its population remains very small (less than 50 breeding adults and often less than 20). The Gap Creek population has been extirpated.

The South Diamond Creek population was greatly diminished by the Divide Wildfire in 1989. Between 1990 and 1996, it was recovering from the effects of the 1989 event. However, in 1996, another wildfire eliminated this remnant population of Gila trout. Extreme fire danger precluded the evacuation of any fish from South Diamond Creek. Its replicate, in Trail Canyon and Mogollon Creek, suffered from both wildfire (Sprite Fire in 1996) and contamination by rainbow trout. The latter may have been a consequence of human introductions.

Mitochondrial DNA studies indicate that the population of Gila trout in McKenna Creek (the third of the five remnant populations) had been recently contaminated with rainbow trout. Therefore, its replicate in Little Creek is of suspect genetic purity. Currently, protein electrophoresis studies are being conducted to definitively confirm the relative genetic purity of each population.

Iron Creek (the fourth remnant population) was replicated in Sacaton and White creeks. However, severe flooding in Iron Creek during winter 1995-96 eliminated much of the habitat formerly occupied by Gila trout in this stream. The White Creek population was established by two translocations (1994 and 1996) involving approximately 550 fish total. In 1996, wildfire burned portions of the White Creek drainage. The effects of this event upon the recently reestablished Gila trout population have not been determined. Sacaton Creek received Gila trout in 1992. Since then, a small population has become established in this stream that provides marginal habitat. Drought in 1995 greatly reduced the population's abundance.

Spruce Creek, the fifth relictual population, has been successfully replicated in Dry Creek. However, wildfire in 1995 threatened both populations, thus calling into question the relative security of this founder population and its replicate. Because of the proximity of Dry Creek to its donor population, most negative natural events that affect one will likely affect the other.

Of the five relictual, founder populations, only three now exist: Main Diamond is in the process of recovering, South Diamond is extirpated, McKenna is contaminated with rainbow trout, Iron Creek is tentatively secured, and Spruce Creek is also tentatively secured. Of their replicates, two are secure: McKnight is maintaining itself at low levels, the persistence of the Sheep Corral population has been and remains tenuous, Gap Creek is extirpated, Trail Canyon and Mogollon Creek populations are considered extirpated, the future of replicates in White and Sacaton creeks are uncertain, and Dry Creek is secure.

As the foregoing indicates, recovery of Gila trout has encountered considerable difficulty (mainly from natural phenomena) in the past 5 years. The goal of maintaining the relictual populations and replicating them in streams within the range of the species once deemed achieved to the extent that the proposal to downlist the Gila trout was formulated by the Service, are no longer considered to have been achieved and recovery efforts continue.

Effects of the Action

Forest management activities such as timber, associated road building and maintenance, and grazing may affect quality and stability of the stream habitat through both direct effects on the streams and on watershed health. The LRMP for the Gila NF directs that habitat managers should comply with the Gila Trout Recovery Plan. Some streams are within grazing allotments, where full implementation of riparian objectives is not expected until the year 2030. Streambank stability is an important issue for Gila trout, but it is not addressed in the LRMP. Resource conflicts and fiscal constraints are identified by the biological assessment as

reasons for slow progress in achieving LRMP goals for riparian and watershed improvements. Nevertheless, the Forest Service has been an active participant in recovery effort for Gila trout, and sufficient management direction exists in the LRMP, if properly implemented in accordance with the Gila Trout Recovery Plan, to preclude projects and activities that would threaten Gila trout recovery.

Cumulative Effects

All remaining populations occur on national forest lands. Any private or state actions in the national forest action area that would require a Forest Service permit would need Forest Service approval.

Conclusion

After reviewing the current status of the Gila trout, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of Gila trout. The Forest Service is a participant in the ongoing restoration effort for the species, which have significantly improved the species's status. Although habitat conditions, such as streambank stability, remain issues for recovery of the Gila trout, implementation of the direction in the LRMP to manage habitat in accordance with the Gila Trout Recovery Plan and to improve riparian conditions should promote recovery.

Incidental Take Statement for Gila Trout

Amount or Extent of Incidental Take

Activities carried out under the LRMP's that could result in incidental take include recreational activities, livestock use of riparian areas, fencing riparian areas and other management actions to enhance Gila trout habitat, and population monitoring. The Service anticipates, however, that incidental take of Gila trout associated with implementation of the LRMP's will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in numbers. Populations may expand and contract in response to the amount of surface water available, which is in turn dependent on seasonal and yearly variation in rainfall.

The Service is therefore defining the anticipated level of take in terms of the condition of the Gila trout's habitat. The anticipated level of incidental take in terms of this surrogate measure is expressed as maintenance of at least the current level of habitat quality. Any decline in habitat quality, as measured by selected habitat parameters, would exceed this level of incidental take.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take:

1. Carry out activities in or near Gila trout habitat in a manner that will minimize impacts on individual Gila trout.

2. Develop and implement habitat monitoring to detect when the anticipated level of incidental take is approached or exceeded.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following terms and conditions implement reasonable and prudent measure number 1:

    a. To the maximum extent practicable, the Forest Service will design and time activities that affect the species and its habitat to minimize impacts on individual Gila trout. Timing should take into account the vulnerability of Gila trout to the activity and the urgency of the activity for improving conditions for the species.

    b. All reasonable efforts will be made to exclude livestock from habitat occupied by the Gila trout.

2. The following terms and conditions implement reasonable and prudent measure number 2:

    a. The Forest Service will develop and implement an annual, standardized monitoring protocol that is based on selected habitat parameters, and that is capable of detecting a decline in habitat quality for the purposes of determining when the anticipated level of incidental take is approached or exceeded.

    b. The Forest Service will transmit annual monitoring reports to the Albuquerque Ecological Services Field Office by December 31 of each year. The reports will briefly document for the current calendar year the collected data on the selected habitat parameters and make recommendations for revising these terms and

conditions to make them more protective of the species, more reflective of habitat conditions, and less restrictive on Forest activities.

Conservation Recommendation

Provide management direction that more clearly resolves potential conflicts between Gila trout recovery and management of other activities.

LITTLE COLORADO SPINEDACE (*Lepidomeda vittata*), LOACH MINNOW (*Rhinichthys* [=*Tiaroga*] *cobitis*), and SPIKEDACE (*Meda fulgida*)

Additional management direction for these three species was provided by the Forest Service during consultation. Because the additional management direction was issued in a combined format for the three fish, the treatment of them here is combined.

Status of the Species (Range-wide)

Little Colorado Spinedace:

The Little Colorado spinedace is listed as threatened. Designated critical habitat includes East Clear Creek (Coconino County, Arizona), Chevelon Creek (Navajo County, Arizona), and Nutrioso Creek (Apache County, Arizona). It is native to most of the north-flowing tributaries and headwaters of the Little Colorado River. Although much reduced from historic abundance and distribution, the range and abundance of this species can vary considerably from year-to-year. In the mid-1980's Little Colorado River Spinedace were taken from eleven localities in the Little Colorado River mainstem, East Clear Creek, Chevelon Creek, and Nutrioso Creek.

Little Colorado spinedace characteristically occupy clear, flowing pools of medium depth, usually over fine gravel bottoms. It seems to avoid deep, heavily shaded pools and relatively shallow open areas. Cover provided by undercut banks or boulders seems to favor the largest concentrations. Available data indicate spawning occurs from May through July. Depending on size of female, the number of eggs present ranges up to 5,000. Fertilized eggs appear to be deposited at random over the stream bottom or on aquatic vegetation or debris. Adult fish collected range up to some 95 mm in length. Foods vary seasonally, but are composed largely of aquatic insects.

Loach minnow:

The loach minnow is listed as threatened without critical habitat. It is endemic to the Gila River basin of Arizona and New Mexico, U.S.; and Sonora, Mexico. It is believed to be extirpated from Mexico. It persists in Arizona only in limited reaches in White River (Gila

County); North and east forks of the White River (Navajo County); Aravaipa Creek (Graham and Pinal counties); San Francisco and Blue rivers and Campbell Blue Creek (Greenlee County). In New Mexico it still occurs in the upper Gila River, including the East, Middle, and West forks (Grant and Catron counties) San Francisco and Tularosa rivers (Catron County), Whitewater Creek (Catron County), and Dry Blue Creek (Catron County).

The loach minnow inhabits turbulent, rocky riffles of mainstream rivers and tributaries. Most habitat is relatively shallow, has moderate to swift current velocity and gravel- to cobble-dominated substrate. Loach minnow first spawn at age 1 year in late winter-early spring. Spawning occurs in the same riffles occupied by adults during the nonreproductive season. Adhesive eggs are deposited on the underside of flattened rocks; cavities usually open on the downstream side with the upstream end being embedded in the substrate. Egg numbers per rock vary from fewer than five to more than 250. Fecundity of individual females ranges from 150 to 250 mature ova. Loach minnow larvae are approximately 5 mm long at hatching. Some fish live to 3 years of age, but most die at age 2. Standard length of most adult fish is less than 70 mm. Loach minnow are opportunistic, benthic insectivores, largely feeding on ephemeropterans and simuliid and chironomid dipterans.

Spikedace:

The spikedace is listed as threatened without critical habitat. It is endemic to the Gila River system of Arizona and New Mexico, and likely occurred in the past in the San Pedro River in Sonora, Mexico. Its distribution in Arizona was formerly widespread in large and moderate-sized rivers and streams, including the Gila, Salt, and Verde rivers and their major tributaries upstream of the present Phoenix metropolitan area, and the Agua Fria, San Pedro, and San Francisco river systems. This species now occurs in Arizona only in Aravaipa Creek, Eagle Creek, Black Creek, and the upper Verde River. In New Mexico, spikedace are now restricted to the mainstem Gila River and its East, Middle, and West forks.

Spikedace occupy flowing waters, usually less than 1 m in depth; adults often aggregate in shear zones along gravel-sand bars, quiet eddies on the downstream edge of riffles, and broad shallow areas above gravel-sand bars. Smaller, younger fish are found in quiet water along pool margins over soft, fine-grained sand. Breeding occurs April through June. Fecundity of females ranges from 90 to 250 ova. The young produced grow rapidly, attaining a standard length of 35 to 40 mm by November of the year spawned. Maximum length attained is generally less that 70 mm. Longevity is typically 1 to 2 years of age with a few fish reaching 3 years in age. Spikedace feed mostly on aquatic and terrestrial insects.

The distribution and abundance of spikedace has been severely reduced by habitat destruction owing to damming, channel alteration and downcutting, water diversion, and groundwater pumping. Introduction and spread of exotic predatory and competitive fishes also contributed to its decline. Habitat alteration also appears to be a major factor in the invasion and

establishment of nonnative fishes in the southwest. Grazing and other activities that degrade riparian areas have also affected the species.

Status of the Species (In the Action Area)

Little Colorado Spinedace:

Populations in national forest waters are limited to the Apache-Sitgreaves and Coconino NF's. In 1994, Little Colorado spinedace were collected from Nutrioso and Rudd creeks. Because of the large population fluctuations observed, it is difficult to determine the number of populations or number of fish within a population that occur on the NF's. It appears that the range and abundance of Little Colorado spinedace have decreased greatly since the mid-1960's; however short-term abundance/scarcity fluctuations make accurate estimates of abundance and trends difficult.

Loach Minnow:

Loach minnow populations still occur on the Apache-Sitgreaves and Gila NFs and formerly occurred on the Tonto and Prescott NFs. All populations are small and either stable or declining.

Spikedace:

The species occurs on the Apache-Sitgreaves, Gila, and Prescott NF's. Generally, the spikedace is declining throughout its occupied range. However, there are no data on number of populations or number of fish within each population in these NF's. The species historically occupied waters of the Tonto NF, but it no longer occurs there.

Effects of the Action

Little Colorado spinedace:

The biological assessment identified the following threats on the Apache-Sitgreaves NF: predation and competition by nonnative fish and egg predation by introduced crayfish, as well as effects on watershed and streams from livestock grazing, timber harvest, fire, and roadbuilding. The extent of these impacts was not described. Nutrioso Creek has been designated by the LRMP as "Priority 1" riparian system for improved management. The LRMP also directs that spinedace habitat is to be managed for at least 60 percent of its *capability*. The biological assessment explains that this does not mean that riparian and stream habitat capabilities for spinedace can be reduced below their potential by Forest activities, because overriding protections are provided by riparian and endangered and threatened species direction. The biological assessment for Apache-Sitgreaves NF concludes: "Full compliance with all Forest Plan management direction will improve physical habitat for the characteristics

for the spinedace." Spinedace and their critical habitat occur within grazing allotments in the Coconino NF.

Loach minnow:

All activities that affect stream flows (quantity and quality) impact the Loach minnow or its riverine habitat. Such activities include: range, recreation and wilderness management, water and soils maintenance, roads and trails construction, timber harvest, and grazing. Grazing is the primary concern.

On the Gila NF, about 75 mi of the Gila River has been closed to cattle grazing, but grazing continues on the watersheds of the Tularosa, San Francisco rivers, and East and Middle forks of the Gila River. Potential impacts of grazing include soil compaction and runoff, which causes streambank instability and sedimentation in streams. The Allowable Use Guide in the Grazing Management amendments to the LRMP's is expected to improve conditions for loach minnow.

The biological assessment for Apache-Sitgreaves NF concludes: "Full compliance with all Forest Plan management direction will improve habitat for the loach minnow, and eliminate adverse effects to the species and its critical habitat." Potential threats on the forest include livestock grazing and road construction and maintenance. Water withdrawal is a greater threat to the species than the habitat degradation associated with grazing. Some loach minnow streams have been designated by the LRMP as "Priority 1" riparian systems for improved management.

The standards and guidelines do not give specific direction for re-establishment of the loach minnow on the Tonto and Prescott NF's.

Spikedace:

All activities that affect quantity and quality of riverine systems may affect spikedace or their habitat. These actions include: range management, timber management, fire and fuels management, minerals management, watershed and soils maintenance, roads and trails management and maintenance. Range, mineral, watershed, and soils management have had the greatest impact on the spikedace.

On the Gila NF, about 75 mi of the Gila River has been closed to cattle grazing, but grazing continues on the watersheds of the East and Middle forks of the Gila River. Potential impacts include soil compaction and runoff, which causes streambank instability and sedimentation in streams. The Allowable Use Guide in the Grazing Management amendments to the LRMP's is expected to improve conditions for spikedace. The same types of impacts and protections apply to the Prescott NF.

The LRMP's for the Gila and Prescott NF's provide general protections for riparian and endangered and threatened species. The standards and guidelines do not give specific direction for re-establishment of the spikedace on other national forests within its historic range.

Little Colorado spinedace, loach minnow, and spikedace:

The Forest Service has issued additional management direction for these three species that supplements and refines the existing LRMP direction for their protection and management. This direction applies to all program areas that have activities with potential affects on the species. The LRMP's, together with this new direction, provide for inventory, monitoring, and implementation of recovery plans, and reduce or eliminate threats from recreational activities, vehicle use, grazing, timber management, roads, mining, and fire management. Specific management direction for individual Forests is also identified.

With the new management direction, harmful effects on the Little Colorado spinedace, loach minnow, and spikedace should be reduced, such that no further actions should occur under the LRMP's that reduce the species' likelihood of survival and recovery, or, in the case of the Little Colorado spinedace, destroy or adversely modify critical habitat.

Cumulative Effects

The known occurrences of the Little Colorado spinedace are all on Forest Service lands. Although they occur mainly on Forest Service lands, the loach minnow and spikedace also occur on the White Mountain Apache Reservation and on private land on Aravaipa Creek. Both species likely face similar threats on non-federal lands.

Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the guidance of the LRMP's.

Conclusion

After reviewing the current status of the Little Colorado spinedace, loach minnow, and spikedace, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's, as supplemented and refined by the new management direction, is not likely to jeopardize the continued existence of Little Colorado spinedace, loach minnow, and spikedace, and is not likely to destroy or adversely modify designated critical habitat of the Little Colorado spinedace. The actions called for in the new management direction should enhance the recovery of these species.

Incidental Take Statement for Little Colorado Spinedace, Loach Minnow, and Spikedace

Amount or Extent of Incidental Take

Activities carried out under the LRMP's that could result in incidental take include fencing riparian areas and other management actions to enhance Little Colorado spinedace, loach minnow, and spikedace habitat, population monitoring, and traffic from livestock and motor vehicles at stream crossings. The Service anticipates, however, that incidental take of the Little Colorado spinedace, loach minnow, and spikedace associated with implementation of the LRMP's will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in numbers. Populations may expand and contract in response to the amount of surface water available, which is in turn dependent on seasonal and yearly variation in rainfall.

The Service is therefore defining the anticipated level of take in terms of the condition of the Little Colorado spinedace, loach minnow, and spikedace's habitat. The anticipated level of incidental take in terms of this surrogate measure is expressed as maintenance of the current level of habitat quality. Any decline in habitat quality, as measured by selected habitat parameters, would exceed this level of incidental take.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the Little Colorado spinedace, loach minnow, or spikedace.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take:

1. Carry out activities in or near Little Colorado spinedace, loach minnow, and spikedace habitat in a manner that will minimize impacts on individual Little Colorado spinedaces, loach minnows, and spikedaces.

2. Develop and implement a habitat monitoring protocol that is capable of detecting when the anticipated level of incidental take is approached or exceeded.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following terms and conditions implement reasonable and prudent measure number 1:

    a. To the maximum extent practicable, the Forest Service will design and time activities that affect the species and its habitat to minimize impacts on individual Little Colorado spinedaces, loach minnows, and spikedaces. Timing should take into account the vulnerability of Little Colorado spinedaces, loach minnows, and spikedaces to the activity and the urgency of the activity for improving conditions for the Little Colorado spinedace, loach minnow, or spikedace.

    b. All reasonable efforts will be made to exclude livestock from the riparian corridor of streams occupied by the Little Colorado spinedace, loach minnow, or spikedace.

2. The following terms and conditions implement reasonable and prudent measure number 2:

    a. The Forest Service will develop and implement an annual, standardized monitoring protocol that is based on selected habitat parameters, and that is capable of detecting a decline in habitat quality for the purposes of determining when the anticipated level of incidental take is approached or exceeded.

    b. The Forest Service will transmit annual monitoring reports for the Little Colorado spinedace, loach minnow, and spikedace to the Arizona Ecological Services Office by December 31 of each year. The reports will briefly document for the current calendar year the collected data on the selected habitat parameters and make recommendations for revising these terms and conditions to make them more protective of the species, more reflective of habitat conditions, and less restrictive on Forest activities.

RAZORBACK SUCKER (*Xyrauchen texanus*)

Status of the Species (Range-wide)

The razorback is listed as endangered with critical habitat.. The remainder of this paragraph is a summary of the designated critical habitat. In Arizona: the Colorado River and its floodplain from the confluence with the Paria River to Hoover Dam, including Lake Mead to the full pool elevation (Coconino and Mohave counties); The Colorado River and its flood plain from Hoover Dam to Davis Dam, including Lake Mohave to the full pool elevation (Mohave

County); The Colorado River and its 100-year floodplain from Parker Dam to Imperial Dam, including Imperial Reservoir to the full pool elevation or 100-year floodplain whichever is greater (La Paz and Yuma counties); the Gila River and its 100-year floodplain, from the Arizona-New Mexico border including the San Carlos Reservoir to the full pool elevation (Graham, Greenlee, Gila, and Pinal counties); the Salt River and its 100-year floodplain from the old U.S. Highway 60/State Route 77 bridge to Roosevelt Diversion Dam (Gila County); the Verde River and its 100-year floodplain from the Forest Service boundary to Horseshoe Dam, including Horseshoe Lake to the full pool elevation (Yavapai County). In New Mexico: the San Juan River and its 100-year floodplain from the Hogback Diversion to the Utah-New Mexico border (San Juan County).

The razorback sucker was once widely distributed and abundant throughout rivers of the Colorado River basin, including major tributaries in Arizona, Colorado, Nevada, New Mexico, Utah, Wyoming, and Mexican States of Baja California Norte and Sonora. Present distribution in the lower basin includes extant populations in lakes Mohave and Mead and small numbers in the Grand Canyon and downriver from Davis Dam to the Mexican border. Populations have been reintroduced in the San Juan, Gila, Salt, and Verde rivers, but their current status is poorly known. Spawning occurs from January through April at water temperatures ranging from 11 to 18°C. Fertilized eggs are deposited in the gravel substrate and hatch within several days. Swim-up fry move toward light sources, perhaps attracted to concentrated planktonic organisms. Little is known about growth in the river or mainstream impoundments. However in streamside impoundments protected from fish-eating predators, growth is rapid with numerous fish within the population reaching 250-300 mm the first year following hatching. Numerous males appear to enter spawning aggregations by age two or three, whereas females appear to join spawning aggregation at age three or four. Razorback suckers are long-lived, with the age of specimens from Lake Mohave estimated to be 40 or more years. Modified habitat and extreme predation pressure from introduced, fish-eating predators appear to be the major factors limiting recruitment under natural conditions.

The decline of the razorback sucker in the lower Colorado River basin is primarily attributable to the impoundment of large portions of the Colorado River and its tributaries. These impoundments greatly modified natural river flow and affected razorback suckers by greatly reducing flows in some reaches, and modifying temperature regimes in others. Razorbacks in impounded portions are subject to the predation pressure described in the preceding paragraph. Its status and reason for lack of recruitment in the few remaining segments with natural flows is poorly understood.

Status of the Species (In the Action Area)

Small reintroduced populations of razorback may persist in the Verde (Coconino, Prescott, Tonto NF's) and Salt rivers (Apache-Sitgreaves NF). Surveys generally collect few fish and fish surviving more than 1 year in the wild are uncommon. Current populations are maintained by continued introductions of hatchery-produced fish. All populations on Forest

Service lands are small; successful spawning under natural conditions in waters on Forest Service lands in the recent past has not been verified.

Effects of the Action

Activities that affect the quantity and quality of water, and associated habitat, originating on or flowing through national forests may affect razorback sucker survival. Such activities include: range management, timber, soil and water management, and road construction and maintenance. LRMP standards and guidelines, both region-wide and specific to individual forests, address general riparian conditions and should, if consistently applied, reduce impacts from these activities and result in improvement in habitat conditions for the razorback sucker.

Region-wide direction in or issued under the LRMP's that should improve habitat conditions for the razorback include the new direction for management of the spinedace, which covers areas of the Verde River; and standards and guidelines for range management, riparian, the Mexican spotted owl, and the northern goshawk. This direction affects both immediate riparian conditions and overall watershed conditions.

The biological assessment for the Tonto NF finds that standards and guidelines for range management, riparian, the Mexican spotted owl, and the northern goshawk will improve the condition of riparian vegetation and watershed conditions, even though the guidelines do not specifically address bank structure and stability, stream width/depth ratios, or habitat complexity, which are of importance to the razorback. The biological assessment indicates that there has been improvement in razorback habitat conditions under the LRMP, and projects that conditions will continue to slowly improve.

The Prescott NF expects new soil and water standards and guidelines to improve watershed management and positively affect razorback habitat in the Verde River. Riparian improvement is identified in the biological assessment as an objective of standards and guidelines in the program areas of Riparian Areas; Wildlife, Fish and Rare Plants; and Vegetation.

The LRMP for the Coconino NF provides standards and guidelines for improvement of riparian habitat structure, with a goal of having the standards and guidelines met on 90 percent of riparian areas below the Mogollon Rim by the year 2030.

The biological assessment for the Apache-Sitgreaves NF's identifies several areas in the LRMP that provide for protection of the razorback sucker. These include direction to manage toward improvement of habitat and recovery of listed species, improvement in riparian conditions, designation of priority riparian systems, and limitations on timber, off-highway vehicles, and other activities when they impact razorback sucker habitat. The biological assessment views razorback habitat on the Apache-Sitgreaves NF's as at the periphery of the species range and of marginal value. No projections of trends in habitat amount or quality were provided.

Cumulative Effects

Nearly all of the range of the species is within Forest Service and BLM lands, or in waters managed by the Bureau of Reclamation. Small private holdings also border these waters. Many of the same activities that affect the species on Federal lands, such as water withdrawal and grazing, probably affect the species on private lands. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the guidance of the LRMP's.

Conclusion

After reviewing the current status of the razorback sucker, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of razorback sucker, and is not likely to destroy or adversely modify designated critical habitat. General endangered species and riparian direction in the LRMP's should, if followed, improve habitat conditions for the razorback sucker, although the expected slow rate of improvement is of concern.

Incidental Take Statement for Razorback Sucker

Amount or Extent of Incidental Take

Activities carried out under the LRMP's that could result in incidental take include fencing riparian areas and other management actions to enhance razorback sucker habitat, population monitoring, grazing in riparian areas, and motor vehicle traffic at stream crossings. The Service anticipates, however, that incidental take of the razorback sucker associated with implementation of the LRMP's will be difficult to detect for the following reason: finding a dead or impaired specimen is unlikely because the species occurs at low densities over a relatively large range.

The Service is therefore defining the anticipated level of take in terms of the condition of the razorback sucker's habitat. The anticipated level of incidental take in terms of this surrogate measure is expressed as maintenance of at least the current level of habitat quality. Any decline in habitat quality, as measured by selected habitat parameters, would exceed this level of incidental take.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take:

1. Carry out activities in or near razorback sucker habitat in a manner that will minimize impacts on individual razorback suckers.

2. Develop and implement a habitat monitoring protocol that is capable of detecting when the anticipated level of incidental take is approached or exceeded.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following terms and conditions implement reasonable and prudent measure number 1:

    a. To the maximum extent practicable, the Forest Service will design and time activities that affect the species and its habitat to minimize impacts on individual razorback suckers. Timing should take into account the vulnerability of razorback suckers to the activity and the urgency of the activity for improving conditions for the razorback suckers.

    b. All reasonable efforts will be made to exclude livestock from the riparian corridor of streams occupied by the razorback suckers. For example, fencing to exclude livestock from occupied habitat will be maintained as well as practicable, given the conditions at and the accessibility of the site.

2. The following terms and conditions implement reasonable and prudent measure number 2:

    a. The Forest Service will develop and implement an annual, standardized monitoring protocol that is based on selected habitat parameters, and that is capable of detecting a decline in habitat quality for the purposes of determining when the anticipated level of incidental take is approached or exceeded.

    b. The Forest Service will transmit annual monitoring reports to the Arizona Ecological Services Office by December 31 of each year. The reports will briefly document for the current calendar year the collected data on the selected habitat parameters and make recommendations for revising these terms and conditions to make them more protective of the species, more reflective of habitat conditions, and less restrictive on Forest activities.

Conservation Recommendations

The Forest Service should develop and issue and implement direction that achieves bank structure and stability, stream width/depth ratios, and habitat complexity that are necessary for razorback recovery.

SONORA CHUB (*Gila ditaenia*)

Status of the Species (Range-wide)

The Sonora chub is listed as threatened with critical habitat. Designated critical habitat includes: Sycamore Creek, extending downstream from and including Yanks Spring (also known as Hank and Yank Spring), to the northern international boundary with Mexico: the lower 2.0 km of Penasco Creek; and the lower 0.4 km of California Gulch, a stream entering Sycamore Creek from the west about 2.4 km downstream from Yanks Spring. In addition to the aquatic environment, critical habitat includes a 12 m riparian strip along each side of Sycamore and Penasco creeks.

The present distribution of the Sonora chub appears to be similar to the species' historic range. In the U.S., where it has remained locally abundant in Sycamore Creek, it occurs in an 8.4 km reach. The reach extends from about 0.1 km below Yanks Spring, downstream to about 1.0 km north of the international border. Stream flow within that reach is intermittent, except during the rainy season; surface discharge from Sycamore Creek usually sinks into the stream bed before reaching Mexico. In Mexico it is limited in distribution and threatened by a variety of factors.

The Sonora chub is the only native fish in Sycamore Creek. Information on the ecology and biology of this species is incomplete. Based on collection dates of young-of-the-year, spawning occurs in early spring. Larval and juvenile Sonora chub were found in Sycamore Creek and in a tributary to Rio Altar in November, indicating breeding may not be limited by season. There is some indication that post-flood spawning occurs regardless of season. It is theorized that spawning tied to freshets is an adaptation to unpredictable rainfall. No data are available on preferred spawning sites, fecundity, larval survival and recruitment, growth, or dispersal. Examination of stomach contents from a few fish revealed aquatic and terrestrial insects and algae.

Potential threats to the species include drought and human actions that affect water quality and quantity and actions that affect streamside habitat, such as grazing, mining and recreation. However, most of the occupied and designated critical habitat of the Sonoran chub is within Pajarito Wilderness and Goodding Research Natural Area; these areas are closed to mining and grazing. Still, trespassing Mexican cattle often enter the area due to frequent cutting of the

border fence, likely by illegal immigrants and drug runners. The introduction of nonnative fish is also a threat.

Status of the Species (In the Action Area)

The Coronado NF is the only Forest in which this species occurs. The size of the population varies with climatic conditions.

Effects of the Action

Grazing, mining, and recreation could affect water quantity and quality within the species' occupied habitat or designated critical habitat. Sycamore Canyon is within the Goodding Research Natural Area and Pajarito Wilderness where timber, mining, and grazing activities are either prohibited or restricted. The LRMP for the Coronado NF includes general direction to protect aquatic habitats and watershed through application of standards and guidelines in Watershed and Soil Maintenance. The Forest Service's new management direction further addresses recreational and grazing impacts by directing road obliteration and closures and by elimination of grazing in riparian corridors. With the new management direction amplifying the LRMP's, harmful effects of grazing and recreation should be eliminated or greatly reduced.

Cumulative Effects

The U.S. portion of the range of the species is on national forest land, where private and state activities that would require a Forest Service permit would be subject to review by the Forest Service.

Conclusion

After reviewing the current status of the Sonora chub, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's, as supplemented and refined by the new management direction for the species, is not likely to jeopardize the continued existence of Sonora chub, and is not likely to destroy or adversely modify designated critical habitat. The new direction ensures that the general LRMP protections are applied to eliminate major threats to the species.

Incidental Take Statement for Sonora Chub

Amount or Extent of Incidental Take

Even some actions taken by the Forest Service to protect the Sonora chub and its habitat, such as obliterating or relocating roads, riparian fencing, and tank reinforcement, are likely to result

in incidental take. The Service anticipates, however, that incidental take of the Sonora chub associated with implementation of the LRMP's will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in numbers. Populations may expand and contract in response to the amount of surface water available, which is in turn dependent on seasonal and yearly variation in rainfall.

The Service is therefore defining the anticipated level of take in terms of the condition of the Sonora chub's habitat. The anticipated level of incidental take in terms of this surrogate measure

is expressed as maintenance of at least the current level of habitat quality. Any decline in habitat quality, as measured by selected habitat parameters, would exceed this level of incidental take.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take:

1. Carry out activities in or near Sonora chub habitat in a manner that will minimize impacts on individual Sonora chubs.

2. Develop and implement habitat monitoring to detect when the anticipated level of incidental take is approached or exceeded.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following term and condition implements reasonable and prudent measure number 1:

To the maximum extent practicable, the Forest Service will design and time activities that affect the species and its habitat to minimize impacts on individual Sonora chubs. Timing should take into account the vulnerability of chubs to the activity and the urgency of the activity for improving conditions for the Sonora chub.

2. The following terms and conditions implement reasonable and prudent measure number 2:

   a. The Forest Service will develop and implement an annual, standardized monitoring protocol that is based on selected habitat parameters, and that is capable of detecting a decline in habitat quality for the purposes of determining when the anticipated level of incidental take is approached or exceeded.

   b. The Forest Service will transmit annual monitoring reports to the Arizona Ecological Services Field Office by December 31 of each year. The reports will briefly document for the current calendar year the collected data on the selected habitat parameters and make recommendations for revising these terms and conditions to make them more protective of the species, more reflective of habitat conditions, and less restrictive on Forest activities.

Conservation Recommendations

1. In cooperation with the Border Patrol and other appropriate parties, construct a stronger border fence strategically located to reduce trespassing Mexican cattle in the occupied or designated critical habitat for the Sonora chub.

2. Evaluate ways to eliminate threats to the Sonora chub from nonnative fish and implement a program to do so.

YAQUI CATFISH (*Ictalurus pricei*)

Status of the Species (Range-wide)

The Yaqui catfish is listed as threatened with critical habitat.. Critical habitat has been designated to include all aquatic habitats on the San Bernardino National Wildlife Refuge in southeastern Arizona. The historic range includes San Bernardino Creek on the refuge and the Rios Yaqui and Casas Grandes basins in Mexico. It no longer occurs in the U.S., except in culture at the Dexter National Fish Hatchery and Technology Center in New Mexico. It has been caught in areas of rivers with medium to slow current over gravel/sand substrates.

Status of the Species (In the Action Area)

The Yaqui catfish does not occur on Forest Service lands, but some parts of the Coronado NF have been considered as potential reintroduction sites. The Coronado NF's finding that the LRMP is likely to adversely affect the Yaqui catfish or its habitat is based on the promotion of recreational fishing for nonnative fish in areas that are potential introduction sites for Yaqui catfish, and concerns about the introduction of nonnatives into the same drainage with historic

Yaqui catfish habitat. These nonnative fishes are potential predators and competitors of Yaqui catfish. Nonnative catfish would also threaten Yaqui catfish through hybridization.

Effects of the Action

All activities on the Coronado NF that affect water quality or quantity and habitat could impact potential reintroduction sites for the Yaqui catfish. Such activities include management of range, timber, fire, soil and water, mining, recreation, roads, trails and facilities. General protections in the LRMP for endangered species and riparian areas provide should promote improvement of potential reintroduction sites.

The Yaqui catfish occurs in the U.S. only in culture. The Fishes of the Rio Yaqui Recovery Plan does not specifically identify introduction sites for Yaqui catfish on the Coronado NF and no critical habitat is designated there. The most significant impact of fisheries management that included introduction of nonnative catfish on the national forest would be to constrain possible reintroduction efforts for the species.

Cumulative Effects

Any private and state activities affecting the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction of the Coronado NF LRMP.

Conclusion

After reviewing the current status of the Yaqui catfish, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of Yaqui catfish, and is not likely to destroy or adversely modify designated critical habitat. Potential impacts on nondesignated reintroduction sites are of concern, but do not rise to the level of jeopardy or adverse modification.

Incidental Take Statement for Yaqui Catfish

The Service does not anticipate that the proposed action will incidentally take any Yaqui catfish.

Conservation Recommendations

1. The Forest Service should designate reintroduction areas on appropriate Coronado NF lands within the species' historic range and develop appropriate protective management measures.

2. The Forest Service should take steps to prevent nonnative fish from invading potential Yaqui catfish reintroduction sites.

YAQUI CHUB (*Gila purpurea*)

Status of the Species (Range-wide)

The Yaqui chub is listed as endangered, with critical habitat designated to include all aquatic habitat on the San Bernardino National Wildlife Refuge in Cochise County, Arizona.

With reclassification of the genus *Gila* in the upper Rio Yaqui basin, *Gila purpurea* is now composed only of those fish occurring in waters on or north of the San Bernardino and Leslie Canyon National Wildlife Refuges. Therefore the present range is believed to be essentially the same as the historic range of the species.

At one time the species was near extirpation in the U.S. A large percentage of existing populations resulted from reintroductions. The species now has populations in a variety of pond and stream habitats within its historic range in the U.S. This species lives in deep pools in creeks, scoured areas of cienegas, and other stream-associated quiet waters. The fish seek cover in daylight, especially undercut banks and areas of accumulated debris. In artificial ponds, adults similarly tend to occupy the lower part of the water column and seek shade. They feed mostly on algae, insects and detrital material. Young fish occupy near-shore zones, often near the lower edge of riffles. Growth to maturity is rapid, often within the first summer of life. Spawning is protracted throughout the warmer months, with greater activity in spring. Reproductive potential is high and large populations develop quickly from a few adults.

Decline of the Yaqui chub probably began with regional arroyo cutting in the late 1800's. The Rio San Bernadino floodplain incised more than 25 ft, and streamside cienegas were drained, except where locally maintained by springs or artesian wells. Cattle grazing destroyed cienegas and wetlands and contributed to watershed deterioration.

Status of the Species (In the Action Area)

The species is believed to have moved up West Turkey Creek perhaps as far as the southerly part of the Coronado NF. A relatively small portion of the species' range, if any, is likely to be within the national forest.

Effects of the Action

All activities on the Coronado NF that affect water quality or quantity and habitat could impact the Yaqui chub. Such activities include management of range, timber, fire, soil and water, mining, recreation, roads, trails and facilities. The biological assessment on the Coronado NF

LRMP suggests that measures to protect recreational residences may "preclude development of a fully functional stream channel and thus reduce the stream's potential for supporting a viable population of Yaqui chub." These residences are provided for in the LRMP. The concern from other activities is watershed health. The standards and guidelines for riparian and endangered species should, if followed, provide adequate protection for the Yaqui chub, which has only a small portion of its range, and no designated critical habitat, within the national forest.

Cumulative Effects

Some private lands are within the range of the Yaqui chub. Any chub on these lands potentially face similar threats to those on Forest Service lands. The El Coronado Ranch is currently developing a conservation plan that would enhance habitat for the species on ranch property. Any private and state activities within the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction of the Coronado NF LRMP.

Conclusion

After reviewing the current status of the Yaqui chub, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the Coronado NF LRMP is not likely to jeopardize the continued existence of the Yaqui chub, and is not likely to destroy or adversely modify designated critical habitat. Impacts from activities provided for in the LRMP may slow or limit recovery, but at present do not threaten the survival of the species, which has at most only a small population on the Coronado NF.

Incidental Take Statement for Yaqui Chub

The Service does not anticipate that the proposed action will incidentally take any Yaqui chub.

Conservation Recommendations

1. The Forest Service should designate reintroduction areas on appropriate Coronado NF lands within the species' historic range and develop appropriate protective management measures.

2. The Forest Service should take steps to prevent nonnative fish from invading potential Yaqui chub reintroduction sites.

AMPHIBIANS

SONORA TIGER SALAMANDER (*Ambystoma tigrinum stebbinsi*)

Status of the Species (Range-wide)

The Sonora tiger salamander is listed as an endangered species without critical habitat. It is known from 32 stock tanks or impounded cienegas in the San Rafael Valley and adjoining portions of the Patagonia and Huachuca Mountains (Collins and Jones 1987; Mike Sredl, AGFD, Phoenix, pers. comm. 1995). Aquatic populations were found at 20 of the 32 sites during 1994 and 1995. At least 6 of the 20 tanks have gone dry during the current drought. Whether the species will recolonize them is unknown. Additional populations may occur on private lands in the San Rafael Valley and possibly at Los Fresnos in the San Rafael Valley, Sonora. Populations consist of aquatic larvae and adult branchiates, and terrestrial adult metamorphs. Primary potential threats to the salamander include predation by nonnative fish and bullfrogs, disease, grazing, floods and drought, illegal collecting, introduction of other subspecies of tiger salamanders that could genetically swamp *A. t. stebbinsi* populations, siltation of stock tanks or erosion and loss of dams that impound water, and stochastic extirpations or extinction characteristic of small populations. Livestock grazing results in trampling of salamanders and eggs, and reduced vegetation cover at and near tanks. Excessive grazing of uplands facilitates erosion and siltation of tanks. Maintenance of stock tanks is necessary to maintain aquatic habitats, but maintenance activities may result in mortality of salamanders or eggs and loss of shoreline cover. Although not an immediate threat, future subdivision and development of private lands in the San Rafael Valley is also a potential threat.

Status of the Species (In the Action Area)

At least 10 of the 20 "extant" sites are located on lands administered by the Sierra Vista Ranger District of the Coronado NF. The ownership of three other sites is in question; but these sites may also be on national forest lands. Forest Service lands are located at the periphery of a block of private lands in the central San Rafael Valley. The most robust salamander populations appear to be in the southeastern portion of the Valley on a combination of Forest and private lands. In this area, particularly on Campini Mesa and in School Canyon, a cluster of six extant sites may form a metapopulation.

Effects of the Action

Forest Service program areas that could potentially adversely impact the species or its habitat include range management, recreation, timber and fuelwood, realty actions, mining, fire management, soil and water management, road construction, and off-road vehicle policies. Of these programs, only range management has had documented effects on the salamander.

The Service informally conferenced with the Coronado on the effects of range management on the salamander in the Lone Mountain, Campini, Duquesne, and San Rafael allotments. The Service found that the proposed actions for the latter three allotments would not likely jeopardize the continued existence of the salamander under the assumption that a plan for maintenance and management of stock tanks located on Forest lands in these allotments is promptly developed. The Coronado NF has agreed to develop and implement the plan to include the following elements: (1) Timing of maintenance to ensure adverse effects to individual salamanders are minimized; (2) minimizing removal or damage to bankline vegetation cover; (3) replacing or adding aquatic cover, such as logs and brush; (4) restricting access by cattle to selected tanks or portions of tanks; (5) public information/education to facilitate compliance with current state regulations on capture, transport, and use of live fish, bullfrogs, and salamanders in the range of the Sonora tiger salamander; and (6) monitoring of salamander breeding sites and periodic inventory for and removal of exotic predators. No other project or program-specific conferences on the species have been conducted.

The salamander has coexisted with livestock, even benefiting from the existence of stock tanks, and is likely to continue to do so in the future. Reasonable efforts to limit impacts to individual salamanders during actions to maintain tanks should increase salamander populations.

Cumulative Effects

The same activities that affect the Sonora tiger salamander on public lands affect it on private lands. Any private and state activities affecting the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction of the Coronado NF LRMP.

Conclusion

After reviewing the current status of the Sonora tiger salamander, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the Sonora tiger salamander. It has persisted in areas subject to long use by livestock.

Incidental Take Statement for Sonora Tiger Salamander

This incidental take statement addresses the incidental take associated with plan-level direction as well as the specific actions identified in the next section.

Amount or Extent of Incidental Take

Incidental Take Associated with Specific Actions:

The Service anticipates the following forms of take as a result of drafting of water from stock tanks for fire suppression, stock tank maintenance, trampling by cattle, and pre-project surveys:

1. A total of 20 salamanders, eggs, and larvae per year in the form of direct mortality or injury resulting from drafting water from stock tanks for fire suppression.

2. A total of 20 salamanders and larvae per year in the form of direct mortality or injury resulting from stock tank maintenance.

3. A total of 10 salamanders, eggs, and larvae per year resulting from trampling by cattle.

4. A total of 100 salamanders and larvae per year in the form of harassment as animals are temporarily moved from harm's way during stock tank maintenance.

5. A total of 200 salamanders and larvae per year in the form of harassment during pre-project surveys of tanks to determine presence/absence of salamanders.

Incidental Take Associated with Plan-level direction:

The specific actions described in the preceding section do not include other actions that may be carried out under the LRMP, such as prescribed fire; changes in route networks, including but not limited to construction of new roads; development of campgrounds and trails; harvest of forest products; realty actions that result in development that in turn fragments salamander habitat or isolates occupied stock tanks; and mining activities. The Service anticipates, however, that incidental take of the Sonora tiger salamander associated with implementation of the LRMP will be difficult to detect for the following reasons: because these activities have not yet been designed or proposed, their precise impact in terms of take of individuals cannot be predicted at this time. In addition, losses may be masked by seasonal fluctuations in numbers; populations may expand and contract in response to the amount of surface water available, which is in turn dependent on seasonal and yearly variation in rainfall.

The Service is therefore defining the anticipated level of take associated with Plan-level direction in terms of the condition of the Sonora tiger salamander's habitat. The anticipated level of incidental take in terms of this surrogate measure is expressed as maintenance of at least the current level of habitat quality. Any decline in habitat quality, as measured by selected habitat parameters, would exceed this level of incidental take.

Effect of the Take

In this biological opinion, the Service finds the anticipated level of take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Sonora tiger salamander:

For incidental take associated with specific actions:

1. Personnel education programs, minimization of project impacts, and well-defined operational procedures (including pre-project surveys for salamanders) shall be implemented.

2. Actions shall be taken to ensure that the spread of neither nonnative predators nor disease is facilitated by project activities.

3. The Forest shall monitor incidental take resulting from the proposed projects and report to the Service the findings of that monitoring.

For take associated with LRMP-level direction:

4. Carry out activities in or near Sonora tiger salamander habitat in a manner that will minimize impacts on individual Sonora tiger salamanders.

5. Develop and implement habitat monitoring to detect when the anticipated level of incidental take is approached or exceeded.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following terms and conditions implement reasonable and prudent measure 1:

    a. The Forest shall inform all livestock permittees within the range of the Sonora tiger salamander of the following:

        (1) Take of salamanders is prohibited under the Act;

(2) permittees are required to notify the Forest at least 30 days prior to initiating maintenance, dredging, or cleaning out of stock tanks; and

(3) if permittees comply with the terms and conditions of this biological opinion developed for the Sonora tiger salamander, they will be covered by the incidental take statement for actions on any lands within their Forest allotment, including private, state, forest, or other lands.

b. Prior to any surface-disturbing activities at stock tanks within the range of the Sonora tiger salamander, the presence/absence of the salamander shall be determined by a qualified biologist (approved by the Forest). If salamanders are not encountered during seining of the pond, the salamander will be considered absent. If salamanders are observed in the water or can be captured with a dip net, seining is not necessary.

c. Individuals authorized by the Forest to maintain, dredge, or clean out stock tanks occupied by Sonora tiger salamanders shall be informed of the legal and sensitive status of the Sonora tiger salamander and shall have a copy of these terms and conditions.

d. New surface disturbance and clearing of vegetation during work at stock tanks shall be minimized to the extent practicable.

e. Maintenance, dredging, and cleaning of occupied stock tanks shall not occur from January 1 through May 31.

f. Oil, fuel, and other equipment fluid shall be stored away from occupied stock tanks in secure containers. Any leaks shall be cleaned up and properly disposed of as soon as they occur.

g. If salamanders or larvae are present prior to dredging or cleaning out of stock tanks and a qualified biologist believes seining of salamanders and larvae out of the tank would reduce mortality and injury, then the tank shall be seined and animals held in suitable tanks, aquaria, or holding ponds and returned to the tank after construction is complete and, in the judgement of the qualified biologist, the tank contains enough water to support the salamanders.

h. During maintenance activities, the amount of underwater objects (logs, rocks, etc.) for salamander cover and egg deposition shall be maintained or increased.

i. Vegetation cover at tanks occupied by salamanders shall be retained or increased through (but not limited to) the use of partial fencing, construction of water lots, double tanks, or alternative waters such as wells and pipelines.

j. Except as needed in emergency situations to abate immediate fire threat of loss of life or property, no water shall be drafted from stock tanks known to be occupied by Sonora tiger salamanders. Other water sources, such as Parker Lake, wells, and water tenders shall be considered before drafting water from occupied stock tanks.

k. In nonemergency situations, water shall be drafted from stock tanks within the range of the salamander only if other sources of water are not available or reasonably accessible, and only if the tanks are not occupied by salamanders, pursuant to term and condition 1.b.

l. An objective of fire suppression activities shall be protection of occupied Sonora tiger salamander habitat, including the watersheds of those habitats.

m. All occupied tanks and apparently suitable tanks (free of nonnative predators) within the range of the Sonora tiger salamander shall be retained in public ownership.

2. The following terms and conditions implement reasonable and prudent measure number 2:

a. If water is drafted from a stock tank within the range of the salamander, it shall not be refilled with water from another tank, Parker Lake, or other sources of water that may support fish, salamanders, or bullfrogs.

b. As opportunities arise, the Forest shall work with AGFD and the Service in the development of interpretive materials for users of the Forest that includes information about legal protection of the salamander and prohibitions on use of live baitfish, crayfish, and waterdogs, and transport of live bullfrogs in the San Rafael Valley.

3. The following term and condition implements reasonable and prudent measure number 3:

a. The Forest shall submit annual monitoring reports to the Arizona Ecological Services Field Office by December 31 of each year beginning in 1997. These reports shall briefly document for the current calendar year the effectiveness of the salamander mitigation measures, activities that occurred in the calendar year that were subject to these terms and conditions, the numbers and locations of salamanders encountered, general condition of salamanders, and the number of salamanders, larvae, and eggs taken. The report shall make recommendations for modifying or refining these terms and conditions to enhance Sonora tiger salamander protection and reduce needless hardship on the Forest, and its contractors and permittees.

4. The following term and condition implements reasonable and prudent measure number 4:

   a. To the maximum extent practicable, the Forest Service will design and time activities that affect the species and its habitat to minimize impacts on individual Sonora tiger salamanders. Timing should take into account the vulnerability of salamanders to the activity and the urgency of the activity for improving conditions for the Sonora tiger salamander.

5. The following terms and conditions implement reasonable and prudent measure number 5:

   a. The Forest Service will develop and implement an annual, standardized monitoring protocol that is based on selected habitat parameters, and that is capable of detecting a decline in habitat quality for the purposes of determining when the anticipated level of incidental take is approached or exceeded.

   b. The Forest Service will transmit annual monitoring reports to the Arizona Ecological Services Field Office by December 31 of each year. The reports will briefly document for the current calendar year the collected data on the selected habitat parameters and make recommendations for revising these terms and conditions to make them more protective of the species, more reflective of habitat conditions, and less restrictive on Forest activities.

REPTILES

NEW MEXICO RIDGENOSE RATTLESNAKE (*Crotalus willardi obscurus*)

Status of the Species (Range-wide)

The New Mexico ridgenose rattlesnake was listed as threatened on August 4, 1978. Critical habitat was also designated in Bear, Spring, and Indian canyons in the Animas Mountains, which is private land east of the Coronado NF. The species is known only from the Animas and Peloncillos mountains, Hidalgo County, New Mexico, and the Sierra San Luis, Sonora and Chihuahua, Mexico (Painter 1995). It is typically found in steep, rocky canyons with intermittent streams or on talus slopes at elevations from about 1,700 to 2,600 m, in areas supporting Madrean evergreen woodland and Petran mixed conifer forest. The species occurs in small, disjunct populations.

Status of the Species (In the Action Area)

The species has been recorded from the Peloncillo Mountains (Coronado NF) in New Mexico: seven specimens have been found from two areas, including five snakes from upper Miller Canyon and a nearby canyon, and two snakes from the vicinity of Cottonwood canyon.

Effects of the Action

Because the snake's primary habitat is rocky, steep, and often inaccessible, conflicts with Forest uses are expected to be relatively uncommon. Prescribed fires and suppression activities associated with wild fires may have the greatest potential for adverse effects on the species. Rattlesnakes may be killed or injured during a fire by heat and flames. Fire would alter habitats of this species dramatically in the short term by reducing or eliminating vegetation cover, woody debris piles, and leaf litter, or altering rock shelters. Reduced cover may increase mortality of snakes from predation. Increased runoff and elevated stream flow associated with storms after fires may drown or wash downstream snakes that are in or adjacent to streambeds. Reduced cover and plant forage for rodent and bird populations may have a detrimental effect on the rattlesnake. LRMP direction in Fires Management and Protection requires that prescribed fire be used to enhance wildlife habitat and improve range conditions.

Grazing occurs in some areas where the species occurs. Trampling by cattle and horses, and mortality from vehicles associated with grazing and grazing improvements may occur. Other potential threats include mining, development, and logging, although impacts from those activities have not been reported.

Cumulative Effects

The New Mexico ridgenose rattlesnake is also found on the Gray Ranch in the Animas Mountains. The Gray Ranch is managed to both provide grazing for cattle and conserve wildlife habitat. Any private and state activities affecting the national forest action area that would require a Forest Service permit would require review by the Forest Service under the direction of the Coronado NF LRMP.

Conclusion

After reviewing the current status of the New Mexico ridgenose rattlesnake, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the Coronado NF LRMP is not likely to jeopardize the continued existence of the New Mexico ridgenose rattlesnake. Despite a number of potential effects, the discovery of additional populations indicates that the species can be considered more secure now than at the time it was listed.

Incidental Take Statement for New Mexico Ridgenose Rattlesnake

Amount or Extent of Incidental Take

The Service anticipates the following forms of take as a result of activities carried out under the LRMP:

1. Two New Mexico ridgenose rattlesnakes as a result of direct impacts, including trampling by cattle or horses associated with grazing, snakes run over by vehicles associated with grazing, vegetation management projects, and construction and maintenance of range improvement projects.

2. Two New Mexico ridgenose rattlesnakes as a result of the direct or indirect effects of prescribed fire.

3. One New Mexico ridgenose rattlesnake as a result of indirect effects of livestock grazing, including reduction of perennial grass cover quantity or quality.

Effect of the Take

In the accompanying biological opinion, the Service determined that the anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of New Mexico ridgenose rattlesnake:

1. The Forest Service will coordinate with the Service to ensure that project-level activities are designed to minimize take of New Mexico ridgenose rattlesnake.

2. Measures shall be included in project-level activities to reduce take of New Mexico ridgenose rattlesnake to the extent possible.

3. The Forest Service will shall monitor grazing activities and incidental take resulting from the proposed action and report to the Service the findings of that monitoring.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following term and condition implements reasonable and prudent measure number 1:

   A plan to minimize impacts shall be developed in coordination with the Service for each prescribed fire, vegetation management project, and range improvement project involving New Mexico ridgenose rattlesnake habitat.

2. The following terms and conditions implement reasonable and prudent measure number 2:

   a. Permittees and all field personnel who implement any portion of activities under the LRMP in New Mexico ridgenose rattlesnake habitat shall be informed of regulations and protective measures as described herein for the New Mexico ridgenose rattlesnake. All field personnel shall be informed that intentional killing, disturbance, or harassment of threatened or endangered species is a violation of the Act and could result in prosecution. All personnel shall be advised that care should be exercised when operating vehicles in the project area to avoid killing or injuring snakes on roads.

   b. To facilitate vegetation recovery after prescribed fire, livestock grazing shall be removed from burned areas in New Mexico ridgenose rattlesnake habitat during at least two monsoon seasons following implementation of the fire.

3. The following terms and conditions implement reasonable and prudent measure number 3:

   a. The Forest Service will inventory and monitor activities within New Mexico ridgenose rattlesnake habitat.

   b. The Forest Service will transmit annual monitoring reports to the Albuquerque Ecological Services Field Office by 15 March of each year beginning in 1998. These reports shall briefly summarize for the previous calendar year: (1) The effectiveness of these terms and conditions: (2) grazing actions initiated or completed including range improvement projects, prescribed fires, and vegetation management in New Mexico ridgenose rattlesnake habitat: (3) allotment monitoring results; (4) any records of New Mexico ridgenose rattlesnake or evaluations of snake habitat; and (5) any documentation of take. The report shall also make recommendations for modifying or refining these terms and conditions to enhance New Mexico ridgenose rattlesnake protection and reduce needless hardship on the Forest Service and its permittees.

BIRDS

AMERICAN PEREGRINE FALCON (*Falco peregrinus anatum*)

Status of the Species (Range-wide)

Listed as endangered in 1970, without critical habitat, the peregrine falcon is a secretive, crow-sized falcon, slatey blue-gray above, whitish with fine dark barring below. The head is black with a masked or helmeted appearance. The wings are long and pointed. It inhabits mountainous terrain with cliffs near water or woodlands, where songbirds (its primary prey) are abundant. Historically, it was found throughout the U.S. but it declined as a result of reproductive failure owing to organochlorine pesticides that caused defective egg shell development. Pesticide residues present in the prey species became concentrated in the peregrine. Prohibition of some pesticides and hacking of captive-reared peregrines into the wild have recovered populations in many areas. Nesting begins in April. Both parents share in incubating the 3 to 4 eggs. Nests are typically on cliff ledges. The young fledge and leave the area by the end of July. Some nesting pairs are resident year-round in Arizona and New Mexico. Wintering populations include some birds that have migrated from northern states. The Service has published an advanced notice of intent to propose delisting of this falcon.

Status of the Species (In the Action Area)

In Arizona, breeding pairs are distributed statewide in suitable habitat, except the low elevation deserts of the southwestern quarter of the State. Populations in New Mexico are sparser and more spotty in distribution. More than 50 breeding pairs occur in Arizona and about 25 pairs are in New Mexico.

Effects of the Action

Activities such as timber and fuelwood, road construction, and recreation near active eyries are the key concerns. They can cause nest abandonment or lethal egg chilling. Spraying of insecticides may harm the peregrine and its eggs, or kill the insects eaten by the other birds that are the prey of the peregrine. Timber harvest and road construction remove habitat for birds that are peregrine prey.

The most serious threats on the national forests are from activities that disturb nesting. Most of the LRMP's have specific standards and guidelines that protect nesting areas of peregrine falcons from disturbance during the breeding season. Closures and other prohibitions may be instituted to protect these areas. The LRMP for the Apache-Sitgreaves NF lacks this type of specific guidance. Protective, forest-specific standards and guidelines for peregrine falcons address monitoring and surveying (Cibola, Lincoln, and Tonto NF's) and trail restrictions (Coronado NF). Most of the LRMP's direct that the species' 1984 Recovery Plan be followed.

Cumulative Effects

Any private and state activities affecting the national forest action area that would require a Forest Service permit would require review by the Forest Service.

Conclusion

After reviewing the current status of the American peregrine falcon, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the American peregrine falcon. Current Forest Service activities directed by the LRMP's are not a factor affecting the major threat to the species; that is, organochlorine pesticides. Protections for nesting areas provided by the LRMP's for most national forests are contributing to the survival and recovery of the species.

Incidental Take Statement for Peregrine Falcon

The Service does not anticipate that implementation of activities under and consistent with the LRMP's will incidentally take any peregrine falcons on the Kaibab, Tonto, Coronado, Coconino, and Prescott NF's, or on national forests in New Mexico. These national forests have specific protections for peregrine falcons within the LRMP's and/or under interagency agreements.

The Service anticipates that take in the form of harm or harassment of nine breeding pairs of peregrine falcons could occur as a result of implementation of the LRMP for the Apache-Sitgreaves NF. This number is based on the existence of nine peregrine falcon eyries within the area covered by the LRMP and the lack of specific protections for nesting habitat of this species. Use of heavy machinery for road construction and maintenance or for other activities can disturb nesting and result in nest abandonment or inhibit adult birds from adequately tending nests. The Service has based the anticipated take on the total number of eyries known on the Forest, and in the absence of more detailed information on the proximity of eyries to potentially disturbing activities. This level of incidental take may be decreased in a revised incidental take statement if the Forest Service can provide documentation that indicates that any of the eyries are sufficiently isolated or otherwise protected to make disturbance of nesting by Forest Service activities unlikely.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize take of peregrine falcons:

Develop and implement specific protective measures that will minimize the likelihood of incidental take of peregrine falcons on the Apache-Sitgreaves NF.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. Develop specific, protective direction to protect peregrine falcons from take. Elements that should be included are:

    a. Survey potential peregrine falcon nesting habitat that may be impacted by Forest activities. Surveys should take place as early as possible during project development so that projects can be designed to minimize any disturbance to peregrine falcons.

    b. Conduct no activities that might disturb peregrine falcons during their breeding and nesting period within one-half mile of suitable nesting habitat, unless the area has been surveyed and found to be unoccupied. Exceptions may be made for certain emergency activities.

    c. Base the survey and protective approaches in a. and b. on the March 1985 Master Interagency Agreement between the Service, Forest Service, and New Mexico Department of Game and Fish .

    d. Transmit the results of surveys to the Arizona Ecological Services Field Office by December 31 of each year, beginning with 1997.

Conservation Recommendations

1. Develop a Master Interagency Agreement, adapted from the existing *Agreement in New* Mexico, with the Service and AGFD for protecting peregrine falcons on national forests in Arizona.

2. Formally add the specific guidance developed as a reasonable and prudent measure in this biological opinion and in any interagency agreement to protect peregrine falcons to the LRMP's when they are next amended.

CACTUS FERRUGINOUS PYGMY-OWL (*Glaucidium brasilianum cactorum*)

Status of the Species (Range-wide)

This small owl is 17 cm long and weighs 62 to 75 g. It is reddish-brown with a cream-colored belly streaked with reddish brown. Some individuals are grayish rather than reddish-brown. The tail is long and rufous with dark bars. It occurs from lowland central Arizona and southern Texas southward and is resident year-round. The Arizona population was listed as endangered on March 10, 1997 (previously proposed critical habitat was withdrawn). It nests in cavities in trees or large cacti. Three to five eggs are laid in late winter to early spring. Incubation requires 28 days and the young fledge in a similar time interval. Habitat is subtropical scrub and woodland including river bottom woodlands, woody thickets, thornscrub, and desertscrub at elevations below 4,000 ft. It often occurs in dense, woody thickets. The diet includes birds, lizards, insects, small mammals, and even frogs and earthworms.

In 1996, the AGFD focused survey efforts in northwest Tucson and Marana, and detected a total of 16 birds, 2 of which were a pair, and 2 of which were fledged young. An additional three pygmy-owls were detected on Organ Pipe Cactus National Monument in 1996, with three additional but unconfirmed reports (Harold Smith, NPS, Organ Pipe Cactus National Monument, *in litt.* 1996). Surveys to date indicate 12 pygmy-owls have been detected in 1997.

Status of the Species (In the Action Area)

This bird is absent from New Mexico and almost extirpated from Arizona. River bottom habitats utilized by the owl have been extensively modified or destroyed by clearing, urbanization, water management, heavy grazing, and hydrological changes. The only records from national forests are historic records from the Tonto and Coronado NF's. The cottonwood habitat for the historical record on the Tonto NF has been destroyed.

Effects of the Action

Any activities that destroy or degrade river bottom habitats may be detrimental to this owl. Range management and road construction are examples. Clearing, unregulated recreational activities and illegal collecting are also of concern. These threats are addressed in new direction for pygmy-owl management that protects occupied sites and ensures that projects are reviewed to avoid impacts to habitat features of any potential habitat.

No cactus ferruginous pygmy-owls are currently known to occupy Forest Service lands; the formerly proposed (now withdrawn) critical habitat on the Coronado NF represented a relatively small portion of the subspecies' range. Nevertheless, the potential for impacts to riparian areas with recovery potential on the Coronado and Tonto NF's are of concern because they could play a significant role in the recovery of the species on public lands. The new management direction requires survey and inventory of potential habitat, with protection of any pygmy-owls found and review of actions affecting potentially occupied habitat. With the new management direction, any harmful effects on the pygmy-owl should be identified and avoided.

Cumulative Effects

The species is susceptible on private lands to activities that clear river bottom habitat or degrade it through poor grazing practices or urban expansion. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the guidance of the LRMP's.

Conclusion

After reviewing the current status of the cactus ferruginous pygmy-owl, the environmental baseline for the action area, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's, as supplemented and refined by the new management direction, is not likely to jeopardize the continued existence of the cactus ferruginous pygmy-owl. The actions called for in the new management direction should enhance the species' recovery.

Incidental Take Statement for Cactus Ferruginous Pygmy Owl

The Service does not anticipate that the proposed action will incidentally take any cactus ferruginous pygmy owls.

SOUTHWESTERN WILLOW FLYCATCHER (*Empidonax traillii extimus*)

Status of the Species (Range-wide)

The southwestern willow flycatcher was listed as endangered in 1995 (60 FR 10694) and critical habitat was designated on July 22, 1997 (62 FR 39129). It is a small bird, about 15 cm long with a grayish-green back and wings, whitish throat, light grey-olive breast and pale yellowish belly. It is found in riparian habitat along rivers, streams, or other wetlands where dense growths of willows, Baccharis, arrowweed, buttonbush, tamarisk, Russian olive or similar plants are present, often with a scattered overstory of cottonwood. The breeding range is southern California, Arizona, New Mexico, western Texas, southern Nevada, and southern Utah. This flycatcher has experienced extensive loss and modification of habitat owing to land

clearing for agriculture, housing, and industrial sites; drainage of wetlands; flooding of reservoirs; and overgrazing. It also is threatened by nest parasitism by cowbirds. It nests in thickets of trees and shrubs approximately 4-7 m or more in height, with dense foliage 0-4 m above the ground, and near surface water. The southwestern willow flycatcher feeds on insects. The breeding season is May through July. It probably winters in Mexico, Central America, and northern South America.

Rangewide, the current known population of southwestern willow flycatchers stands at approximately 300 to 500 territories. This indicates a critical population status; more than 75 percent of the locations where flycatchers have been found are composed of five or fewer territorial birds and up to 20 percent of the locations are comprised of single, unmated individuals. The distribution of breeding groups is highly fragmented, with groups often separated by considerable distances (e.g., approximately 88 km straight-line distance between breeding flycatchers at Roosevelt Lake, Gila County, Arizona, and the next closest breeding groups known on either the San Pedro River (Pinal County) or Verde River (Yavapai County). Additional survey effort, particularly in southern California and Nevada, may discover additional small breeding groups. However, rangewide survey efforts have yielded positive results in less than 10 percent of surveyed locations. Moreover, survey results reveal a consistent pattern rangewide: the southwestern willow flycatcher population as a whole is comprised of extremely small, widely-separated breeding groups or unmated flycatchers.

In determining the current rangewide status, the Service has given consideration to impacts on southwestern willow flycatcher and its habitat from the Bureau of Reclamation's operations and maintenance of the Lower Colorado River and proposed modified operations at Roosevelt Dam, the Corp of Engineer's long range operations of the Lake Isabella Reservoir, and the BLM's Resource Management Plans for their lands in New Mexico. Each of these actions have completed section 7 consultation.

For further background information on the Status of the Species, see the recent designation of critical habitat for it (62 FR 39129).

Status of the Species (In the Action Area)

The flycatcher occurs on or adjacent to 6 of the 11 national forests in the Southwestern Region, although it is likely that the subspecies historically occurred on all these forests. Given the history of loss and degradation of its riparian habitat, the flycatcher's current range is probably a small fraction of its past and potential range. Much of the loss and degradation of flycatcher habitat range-wide has been attributed to the direct and indirect effects of livestock grazing.

Surviving populations are typically small and widely separated. They are found in remnant patches of riparian habitat. The extent of genetic interchange between these populations is unknown. Habitat patches as small as 0.5 ha can support one or two pairs.

Critical habitat has been designated for the southwestern willow flycatcher on certain portions of the national forests; however, the designation notice states that "because of the unprecedented time constraints resulting from the court order, the Service was not able to provide the level of analysis and completeness that it has in the past on such rules." (62 FR 39130). Therefore, the delineation of critical habitat should not be taken as a complete determination as to where on the national forests important flycatcher habitat does, or does not, exist. The rule provides: "The designation of critical habitat does not imply that lands outside of critical habitat do not play an important role in the conservation of *Empidonax traillii extimus*. Federal activities outside of critical habitat are still subject to review under section 7 if they may affect *E.t. extimus*." (62 FR 39135).

The supplemental biological assessment management direction complements the critical habitat designation in terms of where on the national forests important occupied or potentially suitable flycatcher exists. The management direction also puts in place inventory, monitoring, and other procedures that will serve to identify and protect important flycatcher habitat in the future.

The approximate delineations of the designated critical habitat on the national forests are as follows (precise delineations are found at 62 FR 39129). For each of these locations, the boundaries include national forest areas within the 100-year floodplain where thickets of riparian tress and shrubs occur or may become established as a result of natural floodplain processes or rehabilitation:

Arizona:

1. Verde River - Coconino, Prescott, and Tonto NF's. From Sob Canyon to its inflow into Horseshoe Reservoir, including Tavasci Marsh and Ister Flat. Approximately 90 mi.

2. Wet Beaver Creek - Coconino NF. From the gauging station upstream of Beaver Creek Ranger Station downstream to the confluence of Beaver Creek and the Verde River. Approximately 20 mi.

3. West Clear Creek - Coconino NF. From the section line dividing sections 18 and 17 in T13N, R6E downstream to the confluence with the Verde River. Approximately 9 mi.

4. Little Colorado River - Apache Sitgreaves NF. The West, East and South Forks and the Little Colorado River, from the northern Forest boundary upstream to Forest Road 113 on the West Fork, to Forest Road 113 on the East Fork, and to Joe Baca Draw on the South Fork. Approximately 30 mi.

New Mexico:

5. Gila River - Gila NF. From the confluence of Hidden Pasture Canyon downstream to the southerly national forest boundary, together with the portion of the Gila River in the Big Burro Mountains unit of the Gila NF. Approximately 20 mi.

6. San Francisco River - Apache-Sitgreaves and Gila NF's. From the confluence of Trail Canyon downstream to the San Franciso Hot Springs, near the confluence with Box Canyon. Approximately 65 mi.

7. Tularosa River and Apache Creek - Gila NF. From the confluence of the Tularosa and San Francisco Rivers upstream to the source of the Tularosa River, near the continental divide, and upstream on Apache Creek to the confluence with Whiskey Creek. Approximately 37 mi.

The Forest Service has recently undertaken numerous, site-specific actions to protect and recover the southwestern willow flycatcher and its habitat, including both designated critical habitat and nondesignated habitat. These short-term actions are described in Appendices L and O of the supplemental biological assessment).

Effects of the Action

Impacts associated with grazing by wildlife and domestic animals have the most severe impacts on the composition and structure of remaining flycatcher habitat. Trampling may alter riparian plant communities by direct damage to plants, or by damaging soils. Plan densities, cover, biomass, vigor, and regeneration capacities may be reduced in some areas. Grazing may also result in the loss, reduction, or suppression of regeneration of riparian areas. Other potential effects of grazing include increases in duff layers, accelerated decomposition of woody materials, compaction of soils, and bank damage. The presence of livestock near flycatcher nesting areas increases the likelihood of cowbird parasitism of flycatcher nests.

The biological assessments refer to general protections for riparian areas and endangered and threatened species in the LRMP's that should protect the flycatcher and other species from the adverse effects of grazing. These general protections include direction to giving priority to listed species in resource conflicts; establishing minimum shading, stream bank stability, and woody plant composition for riparian habitats; designing grazing systems to minimize impacts; controlling livestock with management or fencing to allow re-establishment of vegetation; consideration of the exclusion of livestock from riparian areas if there is a need to protect listed species. A number of the individual forest biological assessments identify instances where fencing or closure to grazing has resulted from wildlife concerns. The new LRMP standards and guidelines for grazing management (USDA 1995) provide an allowable use guide that could help provide some minimum standards for grazing in the absence of more detailed

management plans. This approach should provide more guidance than the previous, more general riparian guidance.

The new direction provides more detail on how these standards and guidelines are to be interpreted with respect to flycatchers. This direction excludes grazing from occupied flycatcher habitat during the breeding season, calls for monitoring for and control of cowbirds, protects suitable habitat, and protects potential habitat from grazing so that it can regenerate to suitability.

Activities in fire management can benefit flycatcher habitat by controlling fires and reducing fire risk through prescribed burns. Risks to individual flycatchers from prescribed burns should be reduced by following general endangered species protections in the LRMP's in the development of projects. New direction calls for the development of strategies for protecting flycatchers while responding to wildfires, and for preventative measures.

Road and trail construction associated with stream crossings can affect flycatcher habitat. Survey and inventory requirements in the LRMP's and new direction should ensure that such activities do not inadvertently impact flycatcher habitat, and ensure that the needs of flycatchers are considered.

Recreational activities such as camping, picnicking, off-road vehicle use, and hiking in riparian habitat during the nesting season can reduce reproductive success. The new direction requires evaluation of recreational impacts in flycatcher habitats, and that impacts be minimized with appropriate measures.

The recovery of the southwestern willow flycatcher likely will depend the protection of reproducing birds and on the rate that its habitat can be increased. The new management direction directly addresses the key threats to the species and its habitat (including both designated critical habitat and nondesignated habitat), both on a programmatic and Forest-specific level. Suitable and potential habitat cannot be protected if it is not first identified. Service and Forest Service biologists have been concerned that the Forest Service's estimates of amounts of potential habitat are too low. The Inventory, Monitoring, and Mapping section of the Forest Services new direction was designed to address this concern by identifying all suitable and potential habitat on each national forest.

The critical habitat designation includes a list of those activities (public or private) that may adversely modify designated critical habitat or may be affected by such designation (62 FR 39135). Such activities may include:

1. Removing, thinning or destroying riparian vegetation;

2. Surface water diversion or impoundment, groundwater pumping, or any other activity which may alter the quantity or quality of surface or subsurface flow;

3. Destruction/alteration of the species' habitat by discharge of fill material, draining, ditching, etc;

4. Overstocking of livestock; and

5. Development of recreational activities and off-road vehicle operation.

These are the types of activities that the new protective management direction, in combination with the existing protective standards under the LRMP's, are aimed at addressing.

With the new management direction, harmful project designs should be precluded and harmful effects on the flycatcher should be reduced. Both the short-term, site-specific, protective management actions and the longer-term improved management direction undertaken by the Forest Service are very constructive and should improve the species' prospects for recovery.

Cumulative Effects

Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the guidance of the LRMP's.

Conclusion

After reviewing the current status of the southwestern willow flycatcher, the environmental baseline for the action area, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's, as supplemented and refined by the new management direction, is not likely to jeopardize the continued existence of the southwestern willow flycatcher and is not likely to destroy or adversely modify its critical habitat. The actions called for in the new management direction should promote the species' recovery. The Forest Service has stated that this direction will remain in effect until the LRMP's are amended.

Incidental Take Statement for Southwestern Willow Flycatcher

The Service does not anticipate that the proposed action will incidentally take any southwestern willow flycatchers. Following the supplemental management direction will avoid take through exclusion of cattle and other disruptive activities from occupied habitat during breeding season, and through controlling cowbirds.

MAMMALS

HUALAPAI MEXICAN VOLE (*Microtus mexicanus hualpaiensis*)

Status of the Species (Range-wide)

The Hualapai Mexican vole was listed as an endangered species without critical habitat on November 2, 1987 (52 FR 36776). The factors identified in support of listing the subspecies included its rarity and restriction to very limited habitat, and potential threats posed by drought, grazing by livestock and elk, and human recreation. The type locality for the subspecies is in the Hualapai Mountains of Mohave County, Arizona, which is to the west of the Prescott NF. As of the date of the Recovery Plan, the Hualapai Mexican vole had been found between 1,645 and 2,560 m of elevation in the Hualapai Mountains. Three general locations that totaled 255 acres had been identified as vole habitat, with a reported fourth population in another area south of the three known locations. During 1992-1993, according to the most recent review of the status of the vole, 33 Hualapai Mexican voles were captured or observed in eleven areas of the Hualapai Mountains. Three of the areas were in the vicinity of known historical locations and the other eight represent newly discovered locations. In 1993-94, ten Hualapai Mexican voles were identified from two new locations in the Hualapai Mountains. Total trapping efforts from 1991-94 resulted in the identification of 63 individuals in the Hualapai Mountains. The vole habitat sites surveyed from 1991-94 occurred to some degree within the pine-oak vegetation belt. Gambel oak was present at most capture sites and in areas adjacent to Ponderosa pine. The availability of grass is considered critical for this subspecies. The surveys conducted in 1991-94 found that Hualapai Mexican voles also use dry grassy areas on moderate to steep slopes with mainly north-facing aspects.

Status of the Species (In the Action Area)

The Hualapai Mexican vole was formerly believed to be restricted in range to the Hualapai Mountains and Prospect Valley (Hoffmeister 1986). However, Frey and Yates (1995) indicate that the vole's range could include portions of the Prescott NF; the Prescott NF is following their taxonomic conclusions in determining the distribution of *M. m. hualpaiensis* on the Forest. Surveys were conducted on the Forest during 1992 through 1995 (Kime 1995). Voles tentatively classified as *M. m. hualpaiensis* were located in the Chino Valley (Santa Maria Mountains) and in the Bradshaw and Sierra Prieta Mountains. Most sites were in openings along riparian areas.

Effects of the Action

Range, fire, mining, and recreation (dispersed camping) management are the program areas that potentially affect Hualapai Mexican voles. The Prescott NF's biological assessment identifies grazing and dispersed camping as the only activities in the vicinity of Hualapi

Mexican vole habitat, and concludes that the general standards and guidlines for endangered species and range management are sufficient to protect the species. The amended LRMP adopts the basic principle that consideration of endangered and threatened species is a high priority on the Prescott NF, and that all other standards and guidelines are to be supportive of, and not conflict with, direction for endangered and threatened species. Under this authority in the amended LRMP, the Prescott NF has directed that the Hualapi Mexican Vole Recovery Plan be implemented to protect existing populations on the Forest through habitat identification and protection. The Recovery Plan calls for habitat protections, such as livestock and erosion control, to prevent physical degradation of habitat, and gives specific direction to protect springs and seeps. It also requires that recreation, mining, and other uses be evaluated for impacts to the vole, and that necessary corrective actions be taken.

Cumulative Effects

Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the guidance of the LRMP.

Conclusion

After reviewing the current status of the Hualapai Mexican vole, the environmental baseline for the action area, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the Hualapai Mexican vole. Adoption of the species' recovery plan for the management of populations on the Prescott NF should promote the recovery of the Hualapai Mexican vole.

Incidental Take Statement for Hualapai Mexican Vole

Amount or Extent of Incidental Take

Activities associated with grazing and recreational activities could result in incidental take of the Hualapai Mexican vole. The Service anticipates, however, that incidental take of the Hualapai Mexican vole associated with implementation of the LRMP's will be difficult to detect for the following reasons: the species is inconspicuous, and finding a dead or impaired specimen is therefore unlikely. In addition, vole population levels vary naturally and seem to run in cycles in some areas. Any losses may therefore be masked by natural seasonal or year-to-year fluctuations in numbers.

The Service is therefore defining the anticipated level of take in terms of the condition of the Hualapai Mexican vole's habitat. The anticipated level of incidental take in terms of this surrogate measure is expressed as maintenance of at least the current level of habitat quantity and quality. Any decline in habitat quantity or quality from actions under the LRMP's, as measured by selected habitat parameters, would exceed this level of incidental take.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take:

1. Carry out activities in or near Hualapai Mexican vole habitat in a manner that will minimize impacts on individual Hualapai Mexican voles.

2. Develop and implement habitat monitoring to detect when the anticipated level of incidental take is approached or exceeded.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following term and condition implements reasonable and prudent measure number 1:

   To the maximum extent practicable, the Forest Service will design and time activities that affect the species and its habitat to minimize impacts on individual Hualapai Mexican voles. Timing should take into account the vulnerability of voles to the activity and the urgency of the activity for improving conditions for the Hualapai Mexican vole.

2. The following terms and conditions implement reasonable and prudent measure number 2:

   a. The Forest Service will develop and implement an annual, standardized monitoring protocol based on selected habitat parameters, and capable of detecting a decline in habitat quality and quantity for the purposes of determining when the anticipated level of incidental take is approached or exceeded. Habitat parameters measured should include extent and condition of cover by grasses, sedges, and forbs.

   b. The Forest Service will transmit annual monitoring reports to the Arizona Ecological Services Field Office by December 31 of each year. The reports will briefly document for the current calendar year the collected data on the selected habitat parameters and make recommendations for revising these terms and conditions to make them more protective of the species, more reflective of habitat conditions, and less restrictive on Forest activities.

LESSER LONG-NOSED BAT (*Leptonycteris curasoae verbabuenae*)

Status of the Species (Range-wide)

This species was listed as endangered without critical habitat on September 30, 1988. It is found mainly in desert scrub habitat in the U.S. portion of its range. In Mexico, the species occurs up into high elevation pine-oak and ponderosa pine forests. Altitude range is from sea level to 3,500 m. The species roosts in caves, abandoned mines, and unoccupied buildings at the base of mountains where the alluvial fan supports agave, yucca, saguaro, cardon and organ pipe cacti. It is colonial, and frequently found in the twilight area near cave entrances, and it emerges late in the evening to feed. Maternity colonies disperse and migrate southward by fall, returning between late April and early May. The species' range is central Arizona and southwest New Mexico, through much of Mexico, to El Salvador. According to the 1994 Lesser Long-nosed Bat Recovery Plan, the species is far more numerous than was thought when it was listed as endangered in 1988. Approximately 60,000 individuals may reside and feed in the southwestern U.S.

Status of the Species (In the Action Area)

Post-maternity roosts have been reported on the Coronado NF; no maternity roosts are known on Forest Service lands. The lesser long-nosed bat probably forages on agaves in the Coronado NF, and is speculated to forage on portions of the Tonto and Apache-Sitgreaves NF's.

Effects of the Action

Potential Forest programs of concern include recreation (spelunking leading to disturbance of bats), mining (in or near caves) and range management (livestock may eat agaves fed on by bats).

Cave habitats for bats are protected by cave management standards and guidelines in the Coronado NF's LRMP, as amended in 1992. These greatly reduce the potential for disturbance through recreation and mining.

Considerable evidence exists for the interdependence of *Leptonycteris* species and certain agaves and cacti. Livestock grazing in areas with agaves may effect the long-nosed bat, particularly if overgrazing is allowed. Intense grazing could result in trampling of young agaves. Livestock also occasionally feed on flowering stalks of agaves, which are a nectar source for feeding bats. It is not known if the availability of flowering agaves is limiting the population of the lesser long-nosed bat within its historic range, but the population of agaves is huge, estimated in the hundreds of thousands to millions. Under the Coronado NF LRMP, range management restrictions are designed to prevent overgrazing, and should therefore limit

the use of agaves by cattle. The density and distribution of agaves required to satisfy food requirements of bat populations are unknown.

Cumulative Effects

Lesser long-nosed bats forage and roost on private and state lands, where they are subject to the same concerns that apply to Forest Service lands. Any private and state activities in the national forest action area that would require a Forest Service permit would require review by the Forest Service under the guidance of the LRMP's.

Conclusion

After reviewing the current status of the lesser long-nosed bat, the environmental baseline, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the lesser long-nosed bat. The LRMP's provide for protection of caves that the species uses for roosts. Although cattle at times feed on agave stalks, there is little evidence to suggest that the likelihood of survival of the lesser long-nosed bat is limited by a shortage of inflorescences on the national forests.

Incidental Take Statement for Lesser Long-nosed Bat

Amount or Extent of Incidental Take.

The Service anticipates incidental take of the lesser long-nosed bat will be difficult to detect for the following reasons: the species is wide-ranging and has small body size, finding a dead or impaired specimen is unlikely, losses may be masked by seasonal fluctuations in numbers or use of habitat, and the species roosts in habitat where detection is difficult. However, the following level of take of this species can be anticipated by loss of food plants due to livestock grazing and grazing improvement maintenance. The effect of cattle on the landscape can be conceived of being associated with the grazing levels and the improvement maintenance. The anticipated level of incidental take in terms of these surrogate measures is expressed as maintenance of no more that the current level of grazing and the current status of improvements. If grazing levels are increased or if additional improvements are constructed beyond those existing at present, this level of incidental take would be exceeded. Exception will be made for improvements that reduce impacts to the bats; for example, by moving livestock watering structures away from areas with high densities of the bat's food plants.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the lesser long-nosed bat:

1. Loss of lesser long-nosed bat food plants will be avoided to the greatest extent possible from grazing activities, including maintenance of livestock improvements.

2. Woodcutting will be assessed for its impacts on lesser long-nosed bat food plants.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following terms and conditions will implement reasonable and prudent measure 1:

    a. Assess the amount of food plants currently present within areas where livestock grazing is occurring. Adjust livestock grazing levels in order to maintain current levels of food plants for the bat.

    b. Grazing levels will not be increased until it is known that sufficient food plants exist and are being sustained.

2. The following term and condition will implement reasonable and prudent measure 2:

    a. Assess woodcutting activities occurring within a radius of 50 mi (81 km) around known roosts. Limit or eliminate woodcutting if necessary. Consultation with the Service regarding this activity is recommended.

Conservation Recommendations

The Service recommends that the following conservation recommendations be implemented by the Forest Service:

1. Protect, monitor, and survey major roost sites. The results of the surveys may be used in devising a more specific alternative to terms and conditions 1.a. and 1.b.

2. Develop a management plan for Forest Service administered areas within a radius of 50 mi (81 km) around known roosts. The above reasonable and prudent measures and terms and conditions will be used as the basis for such a management plan.

3. Coordinate roost survey and food plant monitoring effort with AGFD, NPS, BLM, and the Tohono O'Odham Reservation.

4. Coordinate with the Service on fire suppression and prescribed burning protocols to minimize impact to lesser long-nosed bats.

MOUNT GRAHAM RED SQUIRREL (*Tamiasciurus hudsonicus grahamensis*)

Status of the Species (Range-wide)

The Mount Graham red squirrel was listed as an endangered species on June 3, 1987 (52 FR 20997). Critical habitat for the squirrel was designated on February 5, 1990 (55 FR 425). Although the Mount Graham red squirrel has historically been restricted to a relatively small area in the Pinaleno Mountains of Arizona, both its range and numbers have declined during the past century. Early accounts of the species' abundance used descriptions such as "common" and "abundant." By the 1950's, the population was described as "not abundant anyplace in the Mountains," and by the mid-1960's was rare enough that it was believed to be extirpated. A report from the early 1960's suggested that the species once occupied the western-most peaks of the range (West Peak and Blue Jay Peak), but no additional records of red squirrels from the western portion of the range have been verified since. As recently as the 1960's, the species ranged possibly as far east as Turkey Flat and as far west as West Peak but currently it is found only as far west as Clark Peak. It is believed that a local extinction occurred on West Peak, possibly owing to a fire in the mid-1970's that both isolated the West Peak subpopulation from the rest of the range and caused losses of habitat.

Although not precisely documented, the decline of the Mount Graham red squirrel may be attributed to the expansion of logging operations in the Pinalenos. By 1973, most accessible and marketable timber had been cut, thereby altering the age structure and density of much of the squirrel's forest habitat. Logging operations and road building to accommodate harvests resulted in areas of windthrow that destroyed additional habitat for the squirrel. Additional losses of old-growth coniferous forest resulted from both natural and man-caused fires, ice storms, recreational development, road construction, and establishment of summer homes, an administrative center and a horse pasture. These direct losses not only reduced the amount of habitat but also resulted in forest fragmentation that may have reduced the quality of habitat since forest edges have a reduced capability to provide the proper microhabitat characteristics for cone storage. This fragmentation might have also isolated some pockets of the squirrel population and prevented successful dispersal and/or movements between areas, thus reducing genetic flow within the population. It has also been suggested that the Mount Graham red squirrel may have suffered from competition with the Abert's squirrel (*Sciurus aberti*). This species was introduced into the Pinalenos in 1941 and 1943 by the AGFD.

Status of the Species (In the Action Area)

Because of past logging, fires, and development, habitat for the Mount Graham red squirrel has been lost. Only about one-half of the original coniferous forests are still considered suitable habitat for the Mount Graham red squirrel. The recent (1996) Clark Peak Fire and associated suppression efforts also adversely affected both red squirrels and habitat to an as yet unknown extent. The post-action biological opinion on the emergency fire suppression and rehabilitation estimated that at least 15 squirrels were taken in the fire suppression action and at least 5 percent of the critical habitat was subjected to high intensity burning.

A habitat analysis published in 1988 determined that only 4,750 hectares was suitable red squirrel habitat in the Pinalenos. The majority of red squirrel habitat (85 percent), in particular the more mature forested stands, has already been surveyed. Some additional middens (cone debris piles used for winter food caching) are likely to be found in the 15 percent of the habitat that is not yet surveyed. A 1986 estimate, using a habitat capability model, suggested that the existing habitat could support up to 502 squirrels. As of October 1991, a total of 549 active, inactive, and abandoned middens had been found in the Pinalenos. A 1991 estimate using the habitat capability model suggested that the existing habitat may support approximately 650 red squirrels.

According to 1991 data, the highest densities of middens (203 of the total 549, or 37 percent) are in the upper elevation Engelmann spruce and corkbark fir association, which constitutes 18 percent of the suitable red squirrel habitat area. Lower densities of middens (78, or 14 percent) are found in mixed conifer stands dominated by Douglas-fir, with white fir and Mexican white pine. The transition between the two associations occasionally contains red squirrel midden densities equal to those in the spruce-fir associations (268, or 49 percent). Population estimates have been derived since 1986. The Spring estimates have ranged from a high of 348 red squirrels in 1986 to a low of 152-169 in 1990. As of 1995, the estimate was between 283 and 352 red squirrels.

The Service's 1988 jeopardy biological opinion on the Coronado NF's Mount Graham Astrophysical Area Plan concluded that the project would result in the direct loss of about ten acres of habitat with an additional 88 to 128 acres becoming degraded to the point that they would never provide midden habitat.

Effects of the Action

Activities designed under the Coronado NF LRMP that could potentially threaten the red squirrel and its critical habitat include management of timber and fuelwood, fire management, fish and wildlife management (particularly for Mexican spotted owl); mining; recreation; and special uses.

The LRMP standards and guidelines for the Mexican spotted owl include a provision that management activities necessary to implement the Mt. Graham red squirrel recovery plan will take precedence over any conflicting standards and guidelines for the owl.

The Coronado NF LRMP requires that all timber harvests be consistent with the Mount Graham Red Squirrel Recovery Plan. Catastrophic fire is a major threat to the red squirrel, and requires active management to reduce fuel loads. There is no specific guidance relative to the red squirrel and fire management, although the biological assessment recognizes the possibility that prescribed burns to reduce the risk of catastrophic fires may have short-term impacts on the squirrel. The LRMP recommends, but does not require, the exclusion of red squirrel habitat from potential mining areas. Increasing recreational use of the Pinaleno Mountains is expected, with demands likely for improved or expanded roads, trails, and campgrounds. The biological assessment states that these projects will be evaluated on a case-by-case basis. Although the LRMP is explicit about roads and motorized traffic, it does not provide specific limits on the amount of recreational use of campgrounds and trails that can be accommodated without affecting squirrel recovery. These potential impacts should be tempered by specific direction provided in the LRMP for management of the Mount Graham red squirrel. The LRMP directs that red squirrel habitat be maintained or improved, and includes road closures and specific guidelines for the astrophysical facilities.

Cumulative Effects

The known occurrences of this species are all on Forest Service lands. Any private and state activities that would require a Forest Service permit would require review by the Forest Service under the direction of the LRMP.

Conclusion

After reviewing the current status of the Mt. Graham red squirrel, the environmental baseline for the action area, the effects of the proposed action, and available information on cumulative effects, it is the Service's biological opinion that continuation of management direction in the LRMP's is not likely to jeopardize the continued existence of the Mt. Graham red squirrel, and is not likely to destroy or adversely modify designated critical habitat. Although the squirrel population remains small and vulnerable, specific protections for the squirrel are provided for in the LRMP. The Service assumes that any expansion of the astrophysical activities that would entail impacts to the squirrel not considered in the Service's previous biological opinion on the amendment of the LRMP for astrophysical development would require additional amendment of the LRMP and section 7 consultation on that amendment.

Incidental Take Statement for Mount Graham Red Squirrel

Amount or Extent of Incidental Take

In its July 14, 1988, biological opinion (consultation number 2-21-86-F-75), the Service identified the anticipated incidental take from implementation of the Coronado NF LRMP and astrophysical development on Emerald Peak as six squirrels per year and abandonment of two middens. Take was anticipated in the form of "harassment or harm", and would result from recreational and astrophysical activities and associated motor vehicle traffic. The Service believes that this anticipated level remains a valid estimate of the incidental take of squirrels from activities under the LRMP. However, detection of most take entailed in this estimate is difficult because finding a dead or impaired specimen from certain causes of take is unlikely. For this re-initiation of consultation on the LRMP, the Service is therefore identifying the anticipated level of incidental take associated with implementation of the LRMP as two red squirrels per year found killed or injured on roads. This expression of incidental take can be more objectively applied and is likely to be correlated to the total of all forms of incidental take from activities under the LRMP on individual red squirrels.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take:

1. Carry out activities in or near Mount Graham Red Squirrel habitat in a manner that will minimize impacts on individual Mount Graham Red Squirrels.

2. Document all dead or injured Mount Graham red squirrels found on the Coronado NF.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following term and condition implements reasonable and prudent measure 1.

a. To the maximum extent practicable, the Forest Service will design and time activities that affect the species and its habitat to minimize impacts on individual Mount Graham red squirrels. Timing should take into account the vulnerability of red squirrels to the activity and the urgency of the activity for improving conditions for the Mount Graham Red Squirrel.

2. The following terms and conditions implement reasonable and prudent measure number 2:

a. The Forest Service will immediately report any dead or injured Mount Graham red squirrels found on roads to the Arizona Ecological Services Field Office. This is in addition to any other pre-existing notification requirements.

b. The Forest Service will transmit annual monitoring reports to the Arizona Ecological Services Field Office by December 31 of each year. The reports will briefly document for the current calendar year the collected data on all documented red squirrel mortalities on the Coronado NF and make recommendations for revising these terms and conditions to make them more protective of the species, more reflective of natural conditions under which mortality might be observed, and less restrictive of Forest activities.

VII. CONTINUATION OF INCIDENTAL TAKE STATEMENTS

General Incidental Take Provisions

Sections 4(d) and 9 of the Act, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of an applicable incidental take statement.

Sections 7(b)(4) and 7(o)(2) of the Act do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the Act requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any

such species on any other area in knowing violation of any regulation of any state or in the course of violation of a State criminal trespass law.

Effect of the Take

For each of the affected species addressed in the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures and Terms and Conditions

The Service believes the reasonable and prudent measures described for each affected animal, for which incidental take is anticipated, are necessary and appropriate to minimize the take. In order to be exempt from the prohibitions of Section 9 of the Act, the Forest Service must comply with the terms and conditions for each affected species, which implement the reasonable and prudent measures. These terms and conditions are nondiscretionary.

Migratory Bird Treaty Act

To the extent that this incidental take statement concludes that take of any threatened or endangered species of migratory bird will result from the agency action for which consultation is being made, the Service will not refer the incidental take of any such migratory bird for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 USC sec.s 703-712) or the Bald Eagle Protection Act of 1940, as amended (16 USC sec.s 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

VIII. CONTINUATION OF CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The LRMP's have been most successful in conserving endangered and threatened species and avoiding resource conflicts when they include specific standards and guidelines for managing each species. The Forest Service has been implementing such guidance in the LRMP's for the bald eagle, American peregrine falcon, Mount Graham red squirrel, and the San Francisco Peaks groundsel, and has recently adopted specific standards and guidelines for the Mexican spotted owl.

The general standards and guidelines that are variously worded in the LRMP's to give priority to endangered species or implement recovery plans are, overall, less successful. There appears

to be considerable variation in how different forest managers apply these generally-stated protections. Some of the biological assessments refer to the standards and guidelines being sufficient, but that they are not always implemented. They may not be implemented because the guidance is too generally worded to give practical direction in developing projects under the LRMP's.

The Service believes that the Forest Service would better meet its responsibilities under section 7(a)(1) to conserve endangered and threatened species by providing specific guidance for protection of each species so that projects can be designed to avoid or minimize conflict and impacts. In addition to the specific Conservation Recommendations offered in the Affected Species accounts, the Service recommends the following to the Forest Service:

1. Issue specific guidance that identifies protective measures for each listed species, with direction that these measures are to be followed in the design and implementation of project-level activities. This recommendation should be considered for all listed species with historic range on or affected by activities on Forest Service lands, and not limited to species formally addressed in this consultation.

2. Issue specific guidance that identifies protective measures for each species proposed for listing, with direction that these measures are to be followed in the design and implementation of project-level activities. This recommendation is offered to address the need to revise direction under the LRMP's and facilitate section 7 review of the existing LRMP's when a new species is listed.

3. Update any guidance issued as new information becomes available that would improve protections for the species or allow activities that are not harmful to the species.

4. Incorporate all or appropriate portions of the guidance into the appropriate LRMP(s) when they are next amended.

The Service leaves to the discretion of the Forest Service the selection of a mechanism for issuing this guidance, whether by Interim Directive, recovery strategy, guidance or direction memorandum, or other method. Available Service recovery plans and measures and recommendations from past, project-level, biological opinions can provide initial material for developing the guidance.

The Service believes that issuance of adequate, species-specific guidance would reduce the number of projects that require formal consultation, the likelihood that incidental take would result from project-level activities, and the likelihood of an adverse biological opinion on those projects that would still require formal section 7 consultation. Avoidance of impacts from continuing activities would also facilitate the implementation of the Forest Service's Every Species Counts Action Plan (USDA 1993)

Throughout our review of the LRMP's, the Service has been hampered by the general lack of summary data in the biological assessments on the amount of and condition of historic and occupied habitat of many of the species. This type of information increases the accuracy of assessment by both agencies of the baseline conditions and effects of the action. To minimize uncertainty in future consultation, the Service makes the following conservation recommendation to the Forest Service:

5. Develop a system for estimating and monitoring population sizes and the amount and condition of historic and occupied habitat for each listed and proposed species on the national forests in Region 3.

The appropriate system may vary from species to species, but should be consistent for each species across the national forests. In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any of the conservation recommendations herein.

IX. REINITIATION STATEMENT

Listed Species and Critical Habitat

This concludes formal consultation on the actions outlined in the request for initiation of consultation. As provided in 40 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) The amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Proposed Species

This also concludes the conference on the effects of the proposed action on the only species herein that is proposed to be listed, i.e., Parish's alkali grass. You may ask the Service to confirm the conference opinion as a biological opinion issued through formal consultation if this species is listed. The request must be in writing. If the Service reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, the Service will confirm the conference opinion as the biological opinion on the proposed action and no further section 7 consultation will be necessary on the proposed action and the species in question.

If this proposed species is listed and this conference opinion is adopted. the Forest Service shall request reinitiation of consultation if: (1) The new information reveals effects of the agency action that may affect Parish's alkali grass in a manner or to an extent not considered in the conference opinion; (2) the agency action is subsequently modified in a manner that causes an affect to the species that was not considered in the conference opinion; or (3) a new species is listed or critical habitat designated that may be affected by the action.

Sincerely,

Assistant Regional Director
Ecological Services

cc: James Lloyd, Forest Service, Regional Office, Albuquerque, NM
Supervisors, Ecological Services Field Offices, Albuquerque, NM and Phoenix, AZ
Steve Chambers, Ron McClendon, Ecological Services, Regional Office, Albuquerque, NM

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